



"The future must always belong to the young."



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CONSERVATION COMMITTEE

A History of Wildlife and Hunting  
on the Upper Mississippi River



By  
Michael Rahn

A Publication Sponsored by the  
Upper Mississippi River Conservation Committee  
1983



*A scene still common on the Upper Mississippi, captured here on film, begs the question, "Is the sun rising or setting for the future of one of America's greatest natural resources?"*

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## Introduction

*A History of Wildlife and Hunting on the Upper Mississippi River* explores events of the Upper Mississippi region from a perspective different than most historical accounts. It takes the view of sportsmen, ecologists, and conservationists as the area changes from wilderness to settlement. As the landscape was tamed and altered, those wildlife populations inhabiting the area responded, some to greater abundance, some to extinction. At the center of this, the river itself is portrayed as a force that ignores time yet grudgingly yields to alteration to suit the needs of the times, herein called progress. This book may dismay the preservationist and put the sportsman on notice. If it evokes emotion it will have provided hope. If it provokes action it will serve its purpose.

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## Foreword

History as a series of recorded events can be presented in as many different lights as there are authors willing to make the effort. So traditionally, one reads accounts of political, social, and economic events that, most likely, inform the reader how the writer saw fit to present them. Interpretation brings out a degree of literary license which may result in a few "stretchers" as Mark Twain called them. This book may contain a few "stretchers" also, unintended or not. I hope they don't crowd the truth too much but since all recorded history is, by nature, secondhand information, we'll probably never know.

Historians have never spent much time on events centering on wildlife and this work is intended to present to the reader a chronological account of events affecting wildlife and wildlife habitat in the Upper Mississippi region. Starting with the early geological history and first explorers, it presents a picture of change from the viewpoint of wildlife populations. It chronicles the immense transformation of the landscape with the coming of white man and the response of the animals that inhabited the area. There are some sad stories contained in this chain of events and some successes. Tears may be shed for the passenger pigeon and hurrahs for the adaptability of white-tailed deer.

Always it is the role of man that leads to the cause and effect discussion. So it is that this book ends with the role of man and a look into the future. If society's values (man's values) call for harmony with wildlife, we will always have the Upper Mississippi region as one of the gemstones of our environment. If decisions say no to this set of values, one can expect far greater change in the future.

If it is true that "as go the wildlife populations of this planet, so eventually goes man," then perhaps our future is not bright. Armed with the lessons of history, we each chart our own course for the future.

Ronald Nicklaus  
La Crosse, Wisconsin  
Summer 1982

## Acknowledgments

Any project that spans the amount of time that this one has, necessarily involves the cooperation of many individuals. Certainly Werner Nagel and Margaret Meniman must be given credit for much effort in compiling the early research. Several chairmen of the UMRCC Wildlife Technical Section have come and gone since this project started. Among these Gus Artus, Art Roseland, and Ron Nicklaus did yeomen work in moving this project along. Editorial assistance was provided by all members of the wildlife section with Dean Dalziel and Jack Shatford contributing many hours of work. Jerry Rasmussen, UMRCC coordinator, contributed significantly to the final editing and copy preparation. Credit must be given to the USFWS—Upper Mississippi Refuge for providing access to the photo archives from which many of the photos were obtained. Lastly, appreciation is extended to all who freely gave of their time and thoughts in chronicling events leading to the Upper Mississippi River we know today.

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# 1

## Early History

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When nature works through her own forces, the thin substrate of earth on which men and animals live changes very slowly. It changes to be sure, and the Mississippi River itself is a record of proof. Creatures that have dwelt along it are more subject to rapid change, to changes in abundance, or even elimination.

Early men who inhabited the upper reaches of the great river were no exception to this fact of life. They left few if any records of their civilizations, save those that were items of daily use that can tell us how they went about the business of living. Just as the Mississippi is an artery of commerce today, so it was in pre-white man times, but additionally it was an artery of communication and war and, perhaps more importantly, a biological and geological community that was hospitable to life.

Some say that the earliest records of civilized life along the Upper Mississippi are from a race of men unrelated to the Indians of recent history. These men built mounds for ceremonial and burial purposes, and—perhaps crude by modern standards—fortifications to protect them from other bands or tribes of prehistoric men that also lived in or near the Mississippi valley. Less arrogant than modern men, they did not try to live where nature had not intended. Their structures were built mostly inland from the river, where periodic flooding of the river basin could not reach. This prudent setback probably served an additional purpose. It made them less vulnerable to discovery and attack by competitors or enemies using the waterway for travel or in quest for food and other necessities of life.

Other archaeologists argue that there can be no convincing case made for claiming these early inhabitants to be unrelated to more recent Indian groups that lived near the Mississippi. But whatever the hereditary facts might be, there's no question that both early and more modern native Americans depended heavily on the river and the wildlife that thrived along it. Just as a civilization succeeding ours could learn a lot from our garbage dumps and landfills, historians and archaeologists have found dump sites from these early men enlightening. Shell and bone heaps near old villages reveal what animals, fish, and other aquatic and terrestrial life were used for food, tools, and even decoration.

The bones of geese, buffalo, and deer (Rau 1884) were found in these heaps, proving that these early men were sophisticated enough in both cooperative effort and hunting methods to take even the largest game found in the area. It was not uncommon for early explorers to find fish hooks made of mammal bones in their investigations of ancient mounds, evidence of the value of both aquatic and land animals to the survival of these peoples.

With the arrival of Europeans in the region in the 1600s, the era of recorded history in the Upper Mississippi began. The early mound builders were long gone, and the written accounts are of Indian groups whose names are familiar: the Chippewa, Sioux, Winnebago, Sac, Fox, and others. Most of the very early Europeans were French and came in quest of wealth, both in furs and souls, to be won by their missionaries. Later it was the English who gradually displaced the French in the region.

The diaries and journals of explorers, missionaries, and fur traders often make reference to the life-styles of the native Americans and record their observations of wildlife and other natural features of the Upper Mississippi region. Often the references to wildlife are brief, without much detail, occasionally inaccurate, and too frequently nonexistent.

Most explorers made little effort to evenhandedly catalog the wildlife they'd seen, or at least it appears so by their mention of the most impressive creatures and neglect of the others. The buffalo, and less frequently the deer and elk, are mentioned in many accounts. Most other wildlife is only occasionally mentioned, though the furbearers do receive mention by those early travelers whose interest in them was financial. Yet there are exceptions.

LeSueur relates a conversation with an early settler (LeSueur 1945) who describes being in a swampland when

some nights it was impossible to sleep owing to their (wild larks') clamor. The honking of the Canada goose, the mewing call of the canvasback, redhead and bluebill, mingled with the whistling call of the pintail and pigeon (wigeon?), mixed with the coarse quacking of the mallard and the more feeble call of the gadwall, made a strange medley of sounds (Figure 1).



Figure 1. One can only speculate how the wildlife of LeSueur's day compared to sights such as this today.

#### And in LeSueur's own words

Still along the river marshes stands the crane, and down from Alaska in the summer the whistling swan sometimes come, and the herring gull blows down from Superior, and it is strange to see them on the inland waters (LeSueur 1945).

LeSueur also wrote of the explorations of the astronomer and geologist Jean Nicolet, who drew magnificent maps of the region.

He loved the Indians and the native life and culture of their tribes. For sixteen years he lived among them, learned their languages, made notes on the flora and fauna, not caring for trade or evangelism but celebrating what he found here. The tradesmen, the whiskey-sellers came, but he was before them.

LeSueur, telling of Nicolet's first sighting of the Mississippi, writes that

Sailing down the Wisconsin (River) for eight days, paddling through wild celery and rice, he was the first to see the bright light mingling in the flood, between shores widening to distances of half a league, the approaching rocky bluffs like towers and battlements of hostile cities; he saw the moose, the elk, the vast herds of buffalo in the sweet meadows, and turkeys crying from the wild woods, and on the 17th of June, 1672, with a joy I cannot express, he saw the great river (LeSueur 1945).

Nicolet also spoke of seeing snipe and plover in thick white swarms over the prairie. "The flesh of larks is delicate," he said, "and the only relief from salt meat."

Father Louis Hennepin, a Franciscan clergyman who some have accused of exaggeration and falsehood in addition to his preference for travel and adventure over the work of the church, is considered by many to be the first white explorer to discover the Upper Mississippi. At times he—like other explorers—was given to very general and nondescriptive references to the wildlife he observed along the Mississippi. Hennepin reached the Mississippi in spring—probably March of 1680 (Shea 1880).

Hennepin, however, refers to it as the "Colbert," something he insisted on doing. He describes it as

running south-southwest, between two chains of mountains which wind with the river, in some places far from the banks. Between the river and the hill are large prairies, on which wild cattle are often seen browsing" (Chambers 1910).

Hennepin also was the first to physically describe Lake Pepin's location farther south on the Mississippi, "about a hundred miles below the Falls of St. Anthony."

Hennepin had named St. Anthony Falls, a cataract "forty or fifty feet high, divided in the middle by a rocky island of pyramidal form. I called the cataract St. Anthony of Padua," (Figure 2) he said, "in gratitude for favors done to me by the Almighty, through the intercession of that great saint, whom we had chosen as patron and protector of all our enterprises" (Chambers 1910).

White man's discovery of the source of the Mississippi itself did not come until July of 1832. It had eluded the efforts of several other explorers before Henry R. Schoolcraft's expedition finally pinpointed it at Lake Itasca (Williams 1953). Perhaps deluded applies here too, for explorers preceding Schoolcraft did name the

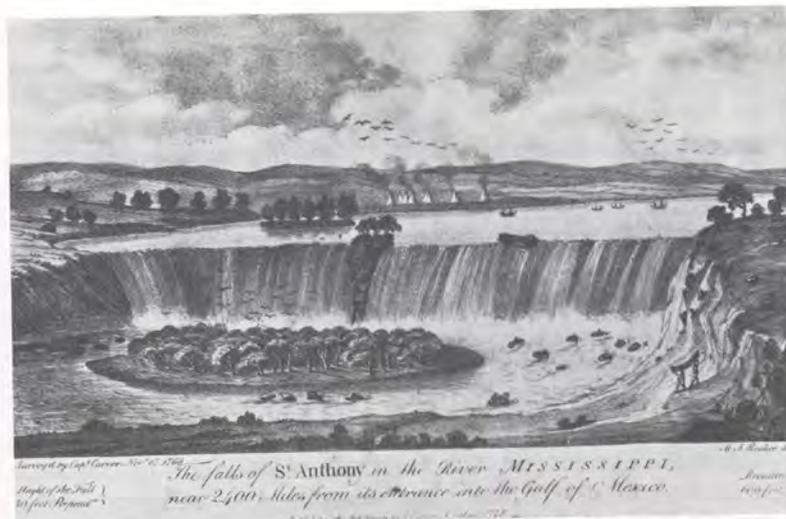


Figure 2. Falls of St. Anthony from [J. Carver's 1838] Carver's Travels in Wisconsin, N.Y., Harpers. Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

river's source, but incorrectly. The tale of several of those who made the attempt and thought they'd succeeded deserves some elaboration, for such a discovery as the Mississippi's source ranks with history's great finds.

Zebulon Pike, a lieutenant in the United States Army, left St. Louis in August 1805, en route to the upper reaches of the Mississippi. In November, as winter began to set in, Pike's men set up camp and built a blockhouse in the area that is now Morrison County, Minnesota, on the west bank of the Mississippi. Pike's group, after suffering a fire in camp in January that nearly destroyed all the detachment's provisions, reached Leech Lake on February 1. They arrived on snowshoes, dragging their supplies behind them on bark toboggans. In Pike's report filed at that time, he committed himself by stating that "this is the main source of the Mississippi." On February 12, when he had reached Cass Lake, then called Red Cedar Lake, he added that "this may be called the upper source of the Mississippi River" (Chambers 1910).

Pike also took the opportunity to inform the local Indians that a new "white father" ruled over them, having found one village over which the British flag was flying. To the Indians themselves,

Pike's complement of men very clearly were neither Englishmen nor French. Perhaps in part due to their ragtag appearance after the arduous winter journey to Red Cedar Lake, the natives tagged them "white Indians."

Pike then began his return march to the blockhouse in the present Morrison County, arriving in March 1806. When the ice broke up on the Mississippi in the spring, Pike and his men returned to St. Louis. So far as Pike's determination of the river's source is concerned, his information was "entirely hearsay, and he accepted the stories told him about the Turtle Lake source," says J. V. Brower. Pike visited the area when the rivers and lakes were locked in ice, and the work of exploring was almost impossible under those conditions (Chambers 1910).

General Lewis Cass was governor of the Territory of Michigan when in 1819 he proposed to Secretary of War John C. Calhoun that an expedition be sent through Lake Superior to search for the source of the Mississippi. Cass and his party—including Henry R. Schoolcraft, who later would find the river's source—left Detroit May 24, 1820, and arrived at Sandy Lake trading post on July 15. Cass then left the main force in camp and, taking Schoolcraft and several others, departed in two canoes to search for the river's source.

Four days after departure, the group reached Red Cedar Lake, which Schoolcraft renamed Cass Lake in honor of the expedition's leader. Schoolcraft himself was a mineralogist. From the Chipewas camped there, Cass was told of a lake called Lac La Biche—Turtle Lake—about 50 miles west-northwest of renamed Cass Lake. This they said, was the river's source. The Turtle River entered Turtle Lake from the north.

"Remarkable as it seems, nobody undertook to find the source of the Turtle River or to circumnavigate the large, shallow lake named after Governor Cass, for other inlets. Had this been done, the entrance of the main stream, leading to the Hauteurs des Terres (height of land) would have been found by Cass in 1820 . . . the untrustworthy statements of the natives were accepted as facts" (Chambers 1910). Cass began his return trip to Detroit on July 21, "after a stay of a few hours" at Cass Lake.

Belated recognition for similar exploration efforts have been given to an Italian, Giacomo Constantino Beltrami, whose exploration took place in 1823. Belated because several of his contemporaries did their best to discredit his efforts. Beltrami did make

the same mistake as predecessors Cass and Pike in naming Turtle Lake as the Mississippi's source. But unlike them, Beltrami did name a river flowing into Cass Lake from the west as a continuation of the Mississippi, which it indeed is.

There are even those who say Beltrami may have actually found the source of the river, namely Lake Itasca. They claim that Beltrami had named Turtle Lake as one of the Mississippi's sources. In his journals Beltrami describes the river entering Cass Lake from the west as being locally called Demizimaguamaguem-sibi and leading directly into Lac Traverse (Lake Bemidji), which indeed it does. Beltrami traveled to Red Cedar Lake and from there in two day's time reached a place he described as "the highest land of North America." After naming it Lake Julia in honor of his patron in Florence, it's reported that he didn't search for an outlet, but immediately announced it "the Julian source of the Mississippi" (Chambers 1910).

Beltrami said this lake was in the shape of a heart, which Chambers has said is the form of Itasca. That may have been an inadvertent mistake on his part, for Height of Land Lake to the west of Itasca is shaped like a heart, whereas Itasca is not. There is also a lake named Heart Lake—and shaped like one, a scant few miles northwest of Lake Itasca.

Lake Itasca, or "true head" as its name translates, was found and named on July 13, 1832, by Henry R. Schoolcraft. Its name is said by Chambers (1910) to have been chosen by Schoolcraft to cast disrespect and discredit on Beltrami's alleged naming of Turtle Lake as the source of the Mississippi.

The journal of a Dr. Douglas Houghton, who accompanied Schoolcraft (1855) on the expedition, was published in 1882 in the *Detroit Post and Tribune*. It provides a narrative of events leading to the discovery of the river's source at Lake Itasca. Among other things, it also discloses the fact that Schoolcraft's party was at Itasca for only three and one-half hours on one afternoon. Houghton's narrative begins after the group's arrival at Cass Lake.

Our party was reorganized for a further prosecution of the exploration. Indians and voyageurs declared that the Mississippi had its origin in a lake called La Biche, sixty miles in a northwesterly direction: actually, nothing was known of the situation above Cass Lake.

(Actually, a look at a map will show that Lake Itasca is west and south of Cass Lake. But Turtle Lake, which local Indians had told previous explorers was the river's source, is northwest of Cass

Lake. Yet it was the Indians who did in fact lead Schoolcraft to Itasca.)

Houghton's narrative continues.

At 5 o'clock a.m. (Wednesday July 11) Schoolcraft, Allen, Boutwell, Johnson and myself embarked. Each of us occupied a separate canoe, paddled by one voyageur and one Chippewa. We ascended the river beyond Lake Cass to a body of water called by the voyageurs Lac Traverse (Lake Bemidji). Proceeding, we passed a series of small lakes and encamped at a point of woods.

July 12th, Thursday, we embarked at 5 a.m., and continued to ascend the stream until 4 p.m., when the guides advised a portage, owing to the tortuous course of the river. (This was the eastern, or Plantagenet branch of the Mississippi.) We portaged two miles across country, soil of diluvial character, containing boulders of trap rock, syenite, and quartz. The course of the stream had been southerly. We camped on again reaching the insignificant creek.

July 13th, Friday—the sun had scarcely arisen when we embarked and ascended the winding brook at which we had encamped the evening before, for twelve or fifteen miles, when we arrived at an expansion of water one or two miles in length, called by the guides Ossowa Lake. Its waters were blackish and bordered with aquatic plants. This lake receives two small brooks, and may be regarded as the source of this branch of the Mississippi. The head of this lake is one-hundred and twenty miles from the forks.

The chief, Yellow Head, pushed his canoe through the weeds of the shore and soon announced his discovery of the portage which would lead to Lac La Biche of the French. Having reached the source of this branch of the great river, it may be noted that its existence as a separate fork of the Mississippi has been hitherto unknown in our maps. Immediately after landing we followed the portage in a westerly direction, wading for some distance before the soil became firm. The course led through a tamarack swamp for about two miles. Thirteen rests were deemed the length of the portage. Having passed over, or rather through, the marshes, we arrived at a series of sandy ridges, supporting a growth of grey pine covered with lichen. These ridges separate the headwaters of the Mississippi and its tributaries from those of Red River.

Having passed over these ridges near four miles, making in all six miles of portage, we arrived at Lake Itasca, near its head. This lake is considered the true source of the Mississippi, and our party was the first which had ever reached it. The lake is small and irregular, having many bays proportionately deep. It is eight miles in length, and has an average width of three-fourths of a mile. The shore rises

considerably to a considerable height above the water, but the soil is of the same barren, sandy kind already mentioned.

The principal timber is grey and yellow pine and aspen. Near the foot of the lake is a small island, upon which we landed, and Mr. Schoolcraft ordered the American flag to be hoisted, and it was so hoisted as to remain a long time. This was the first flag ever hoisted at the head of the Mississippi River (Chambers 1910).

Schoolcraft (1855) himself recounts the actual discovery.

This was the 13th of July, 1832, being three-hundred and five years after the discovery of the mouth of the Mississippi by Narvaez, and two-hundred and nineteen years after the actual discovery of its interior channel by Hernando de Soto. It was a calm and bright day. Itasca lake, as we named it, is about five miles long. (The geographical position of Schoolcraft Island is north latitude 47°13'10", longitude west from G., 95° 12'.) We found the outlet quite a river, with a swift current. We were two days and a night in its descent (to Cass Lake).

There is a cascade a few miles below the lake called Ka-bi-ka, which we ran. We found this stream the larger branch, and about one-third longer than the Plantagenet fork (Chambers 1910).

The Plantagenet fork is the east fork of the Mississippi, leading to Itasca. It joins the west (the larger) fork, at a point about nine miles north of Itasca, near the borders of Minnesota's Hubbard and Clearwater counties.

A number of lakes in the area bear the names of early explorers of the Upper Mississippi. At least two of them—Lakes LaSalle and Marquette—were named by Schoolcraft. Others include Radisson, Groseilliers, Nicolet, Hernando de Soto, Hennepin, and Frontenac. Nowhere near Lake Itasca is Giacomo Beltrami so honored. But to the northeast, above Lake Bemidji and just south of Turtle Lake, is Lake Beltrami. It's a rather fitting tribute to those who believed Turtle Lake to be the "true head" of the Mississippi River.

Some excerpts from collections of the Minnesota Historical Society (1902, 88-89) give a geological picture of the Mississippi's origins.

Geologically considered, the Mississippi River originates in the erratic block-group of drift stratum of the north in longitude 18° west of Washington, and north latitude 47°, 13' 35", agreeably to Mr. Nicolet. This stratum develops itself in a prominent range of sand hills, once perhaps naked ocean dunes, which throw out copious springs of the purest water on all sides. These infant sources of the "father of waters" first gather themselves together in a handsome lake, called Itasca, or La Biche, of some five miles in length, whose

shores are surrounded with deciduous trees—pines being in sight on the neighboring ridges. It has a beautiful island near its center rich with the foliage of the elm, wild cherry, soft maple and other northern species.

From this lake the Mississippi sets out on his wonderful course of more than 3,000 miles to the Gulf by an outlet 16 feet wide with a depth of 14 inches, making a body of pure crystal water, gliding rapidly over its sandy and pebbly bed, in which the traveler as he shoots along in his canoe can see the broken white and pearly valves of the unio and other fresh water shells of the lake scattered in its bed . . . This great northern drift stratum, which constitutes the height of land, rests on a broad range of the crystalline or primary rocks, which cross the continent between latitudes about 44° to 50°, linking together the mountain group of the Labrador and Hudson's Bay coasts with the Rocky Mountains. To these broad ranges and mountain outbreaks as they are developed west of James Bay and north of Lake Superior, Bouchette the geographer of Canada, has applied the name Cabotian mountains, in allusion to the true discoverer of North America (John Cabot).

Agreeably to this theory the St. Louis River, which falls into the head of Lake Superior, presenting a series of magnificent views and cataracts, passes transversely through the Cabotian chain, while the Rainy Lake and the Lake of the Woods lie north of it. This range of transverse rocks with its diluvial and drift covering, does not rise over 1,600 feet above the ocean. It may be said, by its rocky roots, to continue west from the Itasca highlands, and to divide the waters of the upper Missouri from those of the Saskatchewan and Assiniboine valleys of the Red River and Lake Winnipeg [sic]. The natural line of elevations denotes this. It is, in fine, the transverse Wasserscheit, between the Hudson's Bay and the St. Lawrence waters, and those of the Gulf of Mexico.

It is impossible to visit this remote summit, to which the French apply the term *Hauteurs des Terres*, and examine its oceanic dunes, gravel beds, sand plains and other characteristic features, without supposing the present condition of its surface to be the result of oceanic currents, however produced, which at a very ancient period of the earth's history poured their waters over these heights, surcharged with the ruins of broken strata and disrupted formations which once spread over the entire area north of them . . .

Whether ice had any influence in this distribution, let Mr. Agassiz decide. We observe, amidst the heavy beds of comminuted (pulverized) sandstones and slates and primary rocks from remote positions, very widespread evidences of trap and greenstones, grauwackes and amygdaloids, which tell of the prostration of vol-

canic formations, with all their peculiar imbedded minerals and veinstones.

Of these latter, the harder varieties of the quartz family, with zoned agates . . . chalcedonies . . . and carnelians, are found both in the dry drift at the highest elevations, and about the shores of lakes and streams. These masses have been carried by fluvial (moving water) action, down the Mississippi valley to great distances . . . they are often picked up very well characterized on the shores of Lake Pepin. I have traced them as low as St. Louis and Herculaneum (Missouri).

But, interesting as the geology and the geography of the Upper Mississippi might have been to some, and might still be, the most enduring legacy of the great river would be left by those who came to stay. Those who came to live on or near the river, and who would depend on it and use it, and unfortunately, sometimes abuse it and its wildlife and other natural resources too. And still another legacy would be left by those who came to appreciate the rugged yet fragile nature of the river, and who would work to preserve its grandeur and unique character and resources (Figure 3).



Figure 3. *Some events in nature mark time, while others are timeless.*

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## 2

### Socioeconomic Impetus to Settlement

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Even before modern man came to the river, there was change. It was slow change for the most part, however, caused by the work of the relentlessly flowing waters themselves. Unless one has seen a river in flood or opposed its currents with his own muscles, it's hard to appreciate the magnitude of the river's forces.

One might assume that water always takes the path of least resistance and flows where the earth's contours lead it. This is far from a complete picture. One must spend much more time as a watchful spectator of the river to fully appreciate its power. During periods of high water volume, the river can scour out earth and rock in one location and deposit them elsewhere. By doing so the river has constantly altered its bed, forming new channels and oxbow lakes in the process.

As the riverboat captains were to learn during the heyday of nineteenth-century river commerce, this habit of the river was fraught with danger for them, their craft, and their cargoes. Running aground on newly formed shoals or entering dead-end channels were common hazards of the day. The force of river change was nature's, not man's.

The arrival of Europeans in the area of the Upper Mississippi did not immediately bring with it direct changes to the river itself. These newcomers first used the river as an avenue by which they could exploit the other resources that could be found on or near the river and its associated water ways (Figure 4). The resource that first attracted explorers and exploiters to the Upper Mississippi was fur. It brought the aggressive and profit-minded foreign-



Figure 4. Development demanded improved transportation as seen in this photo of the La Crosse, Wisconsin, waterfront in 1895. Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

ers to the lands of the Sioux, the Fox, the Winnebago and the other Indian tribes.

The French and English played the biggest role in these early ventures. Part of the French strategy in the early 1800s was to draw fur trade away from the English in the northern Great Lakes area and Canada. Their logic was that it would be considerably easier for the Sioux to descend the Mississippi with their furs to the French forts, than to carry them northward to the English in winter.

The first French trading houses on the Upper Mississippi north of the Illinois River were located near Lake Pepin on the present Wisconsin-Minnesota border (collections of the Minnesota Historical Society 1902). By 1687 Nicholas Perrot was trading with the Sioux (Figure 5). According to the early French history texts, the maps of Nicolet, Zebulon Pike's journal, and Sioux Indian traditions, the French—probably under Frontenac—did in fact locate their fort near the foot of Lake Pepin. "It became a noted factory for the Sioux," Pike remarked.

LeSueur (1945) reported that

a vast system of trading posts and forts grew up in the wilderness and centers of the fur dynasty [were] held together by the highways of lakes and rivers.



Figure 5. Indians trading furs to the white men. Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

Traders lived like nabobs. Cargoes of furs were brought up and down the rivers in the spring by the voyageurs, traders, Indians, and half-breeds and were counted by Scotch and English clerks and sent yearly to France. Ladies of the court wore the beaver and mink of the wilderness. LeSueur (1945) went on to say that

The palace corridors of Versailles waited impatiently for the wealth of animals, as well as for news of lands taken in the name of Louis XIV; mines of copper, zinc and lead; cities of gold; and exploration—the new line on the map the king had painted on the Easter egg he gave his mistress on Easter morning. There delineated in bright colors, was the latest acquisition along the Mississippi.

The barter for furs that brought great wealth to a few fur-trade kingpins was mostly in the form of tools and trinkets, worth a mere fraction of the value of the furs on the European markets. Knives, awls, needles, tin looking glasses, combs, and bells were the wages often paid to those Indians who captured the fur-bearing animals, processed their skins, and delivered them to the traders. Whiskey often figured in the transactions, usually to the end of making the deals even more profitable for the buyers.

Competition for furs was to flourish between the French and English for decades. But whether the beneficiaries were the French, the English who operated the Hudson's Bay and Northwest companies, or later John Jacob Astor and his American Fur Company, the effects were the same for the native Indian populations and the fur-bearing creatures they trapped. The Indian, once dependent upon the beaver, marten, mink, and other peltries for his personal use, now became employed in their mass harvest for the adornment and wealth of others.

Some furs descended in the traders' boats from St. Anthony Falls (near what is now Minneapolis) to Prairie du Chien, and from there up the Wisconsin River and down the Fox to Green Bay and Mackinac, the destination being the English posts of the Northwest Company. Other traders descended the Mississippi all the way to Ste. Genevieve, or St. Louis, to the French.

In a fairly typical year in the mid-1700s, 182,200 pelts passed through the post at Michilimackinac according to Sir Alexander MacKenzie (1801). Of these, 106,000 were beaver. These beaver pelts, originating primarily in the Upper Mississippi region, would have brought \$.5 million or more on the foreign markets of that time.

According to LeSueur (1945), competition and the struggle for conquest continued unabated for many years, with the English, French, Americans, and Indians involved in a complicated and sometimes shifting pattern of allegiances and rivalries. But this came more or less to an end with the rising star of John Jacob Astor.

Astor had been a poor immigrant, a seller of cakes, who lived above a fur store where he witnessed the transactions being made between trappers and traders and recognized the opportunity for profit that was presented. According to LeSueur (1945), Astor talked to the traders who brought in the furs

and improved upon their methods of trade to such an extent as to create a dynasty in the Northwest, with trading posts, forts, an Army, his own constitution makers and legislators. The American Fur Company was in reality John Jacob Astor.

And also according to LeSueur (1945), it was only after years of warfare that the Northwest Company transferred all its posts to Astor. Astor drove the Hudson's Bay Company north, "murdered traders and English territorial governors alike," and had a law passed that no one but an American could deal in furs within his area of influence. By 1816 Astor had established the central point



Figure 6. An early fort (1833) used in the Upper Mississippi fur trade. Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

for his operations in the Great Lakes region at Michilimackinac in the Michigan Territory, where furs from the Upper Mississippi had once been shipped to the English Northwest Company (Figure 6).

The best-known fur-trading site on the Upper Mississippi was also Astor's greatest trading post, at Mendota near what is now the city of St. Paul. Directly across the river was Fort Snelling. Colonel Snelling noted at the time (LeSueur 1945) he took over command of the fort,

He who has the most whiskey carries off the most furs. The neighborhood where whiskey is sold presents a disgusting scene of drunkenness and debauchery and misery. I have daily opportunities of seeing the road strewn with the bodies of men, women and children in the last stages of brutal intoxication.

The ruthlessness and chicanery with which the early fur trade was carried on was tempered with time, particularly as former territories became states within the region, and the Indian nations became subject peoples. With this change there was also a shift away from the early roles in which the white man was primarily the trader and merchant, and the Indian the principal harvester.

Whites too began to participate in significant numbers in the trapping activities.

While the fur trade in the Upper Mississippi region did not impact the area as much as later agricultural practices would, it very obviously had a direct effect upon the furbearer populations that were being harvested. Due to factors of accessibility or lack of it, there was probably quite a bit of variation in the degree of depletion of furbearer resources within the region. One thing was certain, those areas closest to permanent settlements saw the greatest and most permanent depletion.

Schoolcraft (1855) noted in 1832 that along some Wisconsin tributaries of the Mississippi, "the otter, mink and muskrat are still common, but the beaver and marten, once so numerous, are becoming very rare." Records of the Illinois Department of Conservation (1838) contain a note, which claims that the beaver, "once numerous in the state, by this date seldom seen."

Despite the deep inroads that trapping made in furbearer populations, it's hard to sort out whether trapping or habitat change associated with settlement eliminated some species from particular areas. Knowing the capacity of most wild creatures to fill habitat voids, it seems sensible to suggest that the habitat changes were sometimes factors that prevented depleted furbearer populations from returning to real abundance. In more recent years we've seen some convincing evidence of this. Trapping resources of the Upper Mississippi Wild Life and Fish Refuge from the late 1930s to the present show very healthy furbearer populations. There, furbearer habitat remains favorable. However in other parts of the upper Mississippi region, only the most prolific and adaptable of furbearers—the muskrat in particular—seem to be present in good numbers.

Not only was the Mississippi River a perfect avenue for fur-trade travel, but it served other purposes in the opening up and developing of the region. In addition to the transportation of furs, there was a considerable amount of traffic by "explorers and adventurers." Most of these expeditions were aimed at assessing the region's natural resources or potential for trade. Canoes were the primary means of travel for these men in the late 1600s and throughout the 1700s.

In the early 1800s the river and its navigational potential were explored with other aims in mind. Military men such as Lieutenant Zebulon Pike and Major Stephen Long of the Army Corps of En-

gineers were among those travelers. Major Long voyaged to the Falls of St. Anthony, near what is now Minneapolis, in a six-oared skiff in 1817. His purpose was to "meander and sketch the course of the Upper Mississippi, to exhibit the general topography of the shores and to designate such sites as are suitable for military purposes" (Long 1890).

Early river travel and commerce in small boats had little direct effect on the Mississippi itself. However that was to change in the coming decades. In 1820 a survey of the Mississippi and Ohio rivers was authorized and carried out by the Corps of Engineers. After that survey, the corps was charged with river improvement work, which consisted mainly of removing snags and wrecked boats. In about 1845, the Mississippi River Improvement Committee was formed by grain producers from the five upper Mississippi River states. Their purpose was to exert pressure for the improvement of the river for commerce. Two decades later, in 1866, the committee urged Congress to designate funds to improve the river channel by deepening it and widening it where needed (Carlander 1954).

The first major man-made changes to the river itself were made in 1878 when construction began on a 4.5-foot channel to extend from Minneapolis to the Missouri River. In addition to the dredging work required to deepen the channel, wing dams and revetments were used to divert the river's flow in order to use its own forces to keep the main channel deep enough for navigation. This work did alter some of the character of the river but it still remained essentially what it had been from the beginning, a series of pools. However, instead of being separated by shallow bars and rapids, the shallow points between the pools were no longer as prone to silting over and becoming impassable to riverboats.

These steps toward stabilizing water levels to improve navigation did not in themselves drastically change the river-border wildlife habitat, except on a very localized basis. But they were not to be the final steps in man's effort to fully harness the Upper Mississippi for commerce. The future would bring locks and dams and a dramatic change in the character of the river. It also would bring some drastic changes in the populations of wildlife that were associated with the river.

The fur traders and those who later would come to view the river as a potential artery for all manner of commerce were not the only men of enterprise to discover the Upper Mississippi. So too did the

men of the logging industry. Of the Upper Mississippi River states, Wisconsin and Minnesota were the two whose lands saw most of the commerce in timber. Seemingly endless forests of the region provided wood for everything from matchsticks to houses and factories both locally and for the relatively treeless areas to which timber was shipped (Figure 7). River steamers burned the wood for fuel and bridges spanning the waterway were built from it.



Figure 7. The West Newton Rafting Works in the heyday of logging on the Upper Mississippi. Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

According to Agnes Larson, a thorough historian of the white pine industry in Minnesota,

Much of the lumber went on to St. Louis to help make it a city and to help develop the surrounding country. Minneapolis, St. Paul, Omaha, Kansas City and Des Moines were built largely from Minnesota and Wisconsin lumber.

In 1837, Indian treaties opened to logging the triangle of land between the Mississippi, the St. Croix, and Mille Lacs Lake. By 1839, lumber camps on the St. Croix were feeding logs into the Missis-

sippi for transport further south. By 1848 a sawmill had been built at St. Anthony Falls, which was harnessed for power to run the mill.

Farther south, Winona (by about 1850) had become a strategic point of assembly for logs floated down the Mississippi and its Wisconsin tributary, the Chippewa River.

Timber production in the region skyrocketed after the Civil War (Figure 8). With many powerful financial interests joining what was obviously a very profitable industry, production continued to climb, peaking in the period between 1900 and 1905. Production slumped by the beginning of the First World War and fell still lower by war's end. Timber harvest would continue in the Upper Mississippi River region, but never again with its former intensity.



Figure 8. In days of limitless resources, the timber went on forever. Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

The cutting that was carried on so extensively in some locations along the Upper Mississippi, most notably sections of Minnesota and Wisconsin, quite predictably had its effects upon wildlife populations in those areas. These effects were both direct and indirect. In the northern reaches of extensive pine, the cutting was of particular benefit to such species as white-tailed deer and ruffed grouse, as well as the sharp-tailed grouse. Large-scale cutting resulted in early successional stages of forest regrowth over the har-

vested area. Spruce grouse and moose were more suited to the dark pineries, and they would to a large degree be replaced.

Agriculture naturally made some opportunistic inroads, even in cutover areas where the soil was not well suited for it, and forest regrowth there became a patchwork interspersed with farms. Sharp-tailed grouse, deer, and ruffed grouse benefited from this new diversity in habitat.

Farther to the south hardwoods were the more dominant forest type. Here too setting back of forest succession and the encouragement of brush and shrub growth aided wildlife by enhancing habitat conditions. Although the results of altering the forest habitat were not as dramatic here as in the northern reaches, wildlife populations did respond accordingly to the changes that were made.

Sharptails were probably one of the species that benefited initially, as their usable habitat increased in abundance. "Sharptail grouse . . . came in great numbers to inhabit the short, brushy, burned over areas" (Ryan 1975). The same is true of parts of Wisconsin.

Prairie chickens also benefited from logging, particularly when fires aided in converting some of these areas to grassland. With help from would-be farmers, the encroaching forest was kept back in many such places, to the benefit of the prairie chicken. Advanced farming methods in parts of this enhanced range would someday betray the prairie chicken too. But for the early years after logging, some wildlife species in these localized portions of the Upper Mississippi region would benefit from improved habitat.

Logging had some other direct effects on wildlife numbers during the early years. The influx of logging crews meant that food had to be provided, while much of the staples in camp kitchens were shipped in, wild game often was on the menu for the jacks when they came in after their long days in the woods (Figure 9). Most of the early camps had at least one employee who hunted for camp meat. At other camps local market hunters would provide game on a contract basis. In the areas farthest north the big game might be moose and caribou, while farther south it would be white-tailed deer. Rabbits and other small game were also important as camp food.

Logging may have been a boon to wildlife numbers in the sparsely populated virgin pine lands, as it opened them up and contributed to a better balance of habitat types. But as more settle-



Figure 9. Wildlife provided much of the camp meat for early loggers. Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

ment took place in the Upper Mississippi region and railroads linked communities within the region to one another and to other parts of the nation, pressures on wildlife populations would increase dramatically (Figure 10). One of those pressures would come from another harvest-oriented land-use pattern with even more far-reaching effects on wildlife.

To those trying to earn their living from the land in the well-settled eastern states, the middle west and Upper Mississippi River states must have looked as inviting as the New England colonies had to earlier immigrants. Here was room to settle, room to grow. The early decades of the 1800s saw just such a movement into our region, a place seen as a promised land where land was cheap and the future bright. Illinois and Iowa were seen as offering the best prospects for the development of agriculture as a significant economic force along the Upper Mississippi.

During 1832 and 1833, the Potawatomis, Chippewa, and Ottawa Indians ceded the last major tracts of their land in northern Illinois to the government (Bradford 1846). Federal officials cleared all remaining Indian titles from the state of Iowa in a series of major treaties between 1832 and 1851 (Bogue 1963). "In less than thirty



Figure 10. End of an era, the last log raft moving down river past Marquette, Iowa, August 1915. Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

years the Sacs, Foxes, Potawatamis, Chippewas, Ottawas, Omahas, Iowas, Otos, Missouris, Winnebagos, and a number of bands of Sioux relinquished all their rights in Iowa" (Royce 1896-1897). Settlement was well under way before the Homestead Act of 1862, as evidenced by the fact that little Illinois land and less than a million acres in Iowa were acquired under its provisions (Bogue 1963).

The early agricultural efforts along the Upper Mississippi changed the landscape in two obvious ways and so affected the wildlife that lived there. The moldboard plow was the implement that wrought the greatest change. The other was the crosscut saw, used to cut down trees in many a prairie grove to build farmhouses, barns, and other structures. With farms came the need to confine livestock. Before the days of barbed wire, this meant an additional demand for lumber for rail fences. Farmers in the river counties often traveled distances of 12 to 15 miles with a team to cut their own wood in a neighboring grove. With more than a touch of understatement, an 1850s Iowa farmer noted that this was a distance that "a New England farmer might find a little inconvenient." In the East, such materials had usually been much closer at hand.

The river groves of cottonwood, willow, locust, elm, and poplar were not the answer to the long-term needs of the growing region. That would come from the pine timber country and the mills up-river in Wisconsin and Minnesota. Still the prairie groves supplied what they could until many were exhausted. And when they were, their potential as homes for ruffed and sharp-tailed grouse, wild turkeys, other small game, and to some extent white-tailed deer, were diminished or eliminated.

By the time of the early agricultural inroads into the region, important changes were already taking place in the overall wildlife picture. Buffalo were near the brink of survival as market hunting pressure and government policy encouraged its slaughter. But as a thriving, free-roaming creature it was doomed anyway, by something that could not be regulated as easily as hunting. Farming would forever change the plant community over much of the former prairie region, and fences would be emplaced to cut the limitless sea of grassland into small personal dominions. The buffalo faced double jeopardy.

The buffalo (bison) was chiefly a curiosity during agriculture's early years in our region. This was true as early as the 1830s, when agriculture could still be said to be in its infancy. The last buffalo killed east of the Mississippi in Wisconsin was reported to have been killed in 1832 in Trempealeau County, while Illinois Department of Conservation (1838) records cite reports that the great shaggy beast had left the state. The areas of Iowa and Missouri near the Mississippi could not have been far behind in seeing this species approach its vanishing point.

The regions farther west in these states were not devoid of buffalo until somewhat later, but no longer would they see the uncountable hordes shake the earth in their spectacular comings and goings of migration. The last buffalo reported in eastern Minnesota, much farther north, was killed in the 1850s. Three decades later the last herd of about 75,000 animals would head north through the Red River Valley and the Black Hills where they would meet about 5,000 professional hunters and at the same time meet their demise as a thriving, wild population.

The animal that had provided food, clothing, shelter, medicine, fuel, knives, axes, arrowheads, dishes, ropes, thread, and bowstring to the American Indian was gone as a sustaining resource to the red man. Even without this tragedy the Indian was headed for subjugation and relegation to small parcels of land unwanted

by the whites. With the loss of the buffalo, the Indian saw his last hope for independence vanish. It is widely believed that this chain of events was looked on favorably by the federal officials at that time. The west could not be freely and safely settled without a solution to the Indian problem. The demise of the buffalo made the task that much easier.

The elk, another widely distributed big-game resource along the Upper Mississippi River, was mentioned as being very abundant in the accounts of LaSalle, Hennepin, Tonty, and other early explorers (Beckwith 1903). But like the buffalo, it too was essentially a grazing migrant from one season to the next. It too suffered when its range was broken up by agricultural activity, retiring farther west and eventually finding only the foothills and mountains of the far west a safe refuge.

Elk were also sought eagerly for meat to supply the game markets and the logging and railroad camps of the burgeoning region. Illinois reported that the species had vanished by 1838. Iowa and Missouri were not far behind in witnessing the demise of this large member of the deer family. Large numbers of elk were slaughtered in Iowa during the severe winter of 1855-56 and would disappear from that state in about 1867 (Fashingbauer 1965).

Aldo Leopold (1929) reported that the last elk seen in Wisconsin was sighted in Mississippi River-bordering Buffalo County in 1858, though Bersing (1966) dates a Buffalo County sighting in 1868 as being the last. Into the 1870s and 1880s elk sightings in river-bordering areas of central and northern Minnesota were not uncommon, but by the 1890s only the tiniest remnant remained in that state, and it was in the northwest, far from the river.

Another member of the deer family was not to share this same fate. The white-tailed deer had been recorded in the journals of early visitors to the region as grazing in "innumerable herds" in company with the elk and buffalo. But when the buffalo and elk faded, the deer managed to hold on. What the whitetail had going for it was its restricted movement patterns and its adaptability. It was not a seasonal migrant like the elk and buffalo, and the breaking up of the prairies did not cut the same gaps in its lifeline. Although it was a grazer of prairie grasses, it was also a browser of woody plants. In other words, it was a more versatile animal than its relatives. It was in many ways better prepared for the changes wrought by early agriculture and augmented its diet with early farm crops such as corn or flax. Where prairie groves were com-

pletely removed in some areas, there may have been some displacement or loss in deer numbers, but the whitetail proved itself relatively compatible with the early agricultural land changes.

Whether because of reduced competition with other species or new and diverse food sources that accompanied the planting of the prairies and disturbance of mature forest growth, deer numbers actually increased in some areas during this period. The Illinois Department of Conservation (1838) reports that there were signs that deer were "more abundant at this time than when the country was first settled." As was previously mentioned, this same phenomenon would occur somewhat later in the heavily forested portions of the Upper Mississippi valley to the north. There it would be the removal of mature trees that would diversify food supplies and actually improve conditions for many species of forest wildlife.

The effects of agriculture differed from those of timber harvest in some important ways. Whereas timber cutting made temporary changes in a natural system of plant succession, farming changed the plant system over most of the acreage to which it was applied. Agriculture was a self-perpetuating land-use system, and to fully exploit the land's potential it required the development of more permanent transportation systems and supportive services and businesses. Agricultural areas were much more likely to provide an impetus for population growth and permanence of settlement, than were the timber-harvesting regions.

These agricultural areas followed a pattern of progressive development that would eventually see the trend of greater deer abundance begin to reverse itself. This was not due merely to the character of the land changes themselves, but also to the demands made directly on the deer resource by the rapidly expanding human population of the agricultural regions for food and for cash. According to Bersing (1966), who was speaking in particular of Wisconsin,

wanton deer killing by means of fires, hounding, hunting for the market, and other unsportsmanlike methods, along with the influx of settlers, accounted for the decline of the deer, or the wiping out of the herd, in many southern counties before the Civil War.

Deer reportedly reached their lowest point of population in Wisconsin in the early 1900s. They would eventually rebound, but not before significant protection was provided to them.

The same patterns held true to varying degrees in many of the river counties of the other Upper Mississippi states. Through loss of habitat to early agriculture and unregulated and indiscriminate harvest, deer numbers dwindled as settlement gathered steam. Protection would eventually help in these cases too, except where the most intensive and permanent land-use patterns destroyed the quality of habitat. Early agriculture by itself was not the greatest threat to white-tailed deer populations of that time. But the agriculture of the future with its emphasis on maximizing harvests and utilizing all possible land would one day make its contribution to reducing the value of the remaining habitats for deer.

Early agriculture had some very notable effects on small-game species as well. One of these was an upland bird that would come to be highly valued in the game fields and markets of the day. This was the prairie chicken or pinnated grouse. Actually it is the story of two upland game birds, for its close relative the sharp-tailed grouse was also affected by early agriculture, and the abundance of the two species often fluctuated oppositely in response to the same changes in the land.

The prairie chicken was and is a bird of the prairie grasslands. Its relative, the sharptail, inhabits a similar general territory, but favors locations where brushy woodlands are interspersed with patches of grassy, open cover. In the Upper Mississippi states near the river, prairie groves or timbered fringe uplands were the sharptail's favored habitat, while the more open grasslands nearby might host the spring spectacle of "chickens" performing their ritual booming and courtship display. The ranges of the two birds did overlap, but the sharptail tended to be a more northerly bird and ranged well into Canada. Sharptails were abundant as far south as Illinois even as late as the mid-1840s.

As early agriculture actually boosted white-tailed deer numbers in many areas, it did the same for the prairie chicken. But as is so often true in nature, what is good for one species can be unfortunate for another, in this case the sharptail. Some carefully recorded observations in southern Wisconsin demonstrate this natural relationship and probably typify the response of these birds to land changes in other areas of the Upper Mississippi valley.

Early agriculture helped to expand the prairie chicken's range in southern Wisconsin by changing the cover from predominant forest and brushlands with fire-created openings to predominant croplands and grassy pasture lands. As more and more land was

cleared of wooded cover the sharptail's domain shrank. But the remaining and newly created grassland adjacent to the encroaching farm fields proved to be ideal for the prairie chicken, and this bird flourished and actually expanded its range.

As the midpoint of the nineteenth century was approaching, the sharptail was still the more dominant prairie grouse in southwest Wisconsin and northern Illinois. But from that point on its slide could be documented clearly, while prairie chicken numbers were observed to increase in areas where field and grassland inexorably replaced brushy woodland. Similar bird-habitat relationships existed in other river-bordering areas of the Upper Mississippi states. But as one moved southward, the natural distribution probably favored the prairie chicken, though many early records of these birds did not make distinction between these two close relatives.

Time, however, was definitely not on the side of the prairie chicken. The day would come when small-grain farming would be supplanted by row crops, clean fence lines, fall plowing, and grazing by dairy and beef herds. Agriculture would one day no longer be a force that augmented year-round food supplies and maintained open land to this bird's benefit.

Modern agriculture has been especially hard on waterfowl and other species of wildfowl that are associated with wetlands and marshes. Drainage to increase cropland acreage is today's cause for that label, but in agriculture's early days in the Upper Mississippi valley things were different. Early agriculture did not have at its disposal sophisticated drainage methods such as power ditching and tilling. Some drainage was of course being practiced, both for agricultural purposes and to enhance the usability of marginal lands for commercial and perhaps residential purposes.

As early as 1819, according to Illinois Department of Conservation (1819) records, a lottery was held to raise funds for wetland drainage. By the midpoint of the century numerous drainage districts were springing up in the states along the river. Lands that some had considered suitable only for "producing wildfowl in great number during their seasons, rank grass, bullfrogs, mosquitoes and malaria" were being converted to man's uses.

Early agricultural and related drainage may have had minor effects on the Mississippi flyway's total wildfowl populations, but even this would be little noticed during peak migration times. Migratory wildfowl populations were and are very different from

populations of resident game animals. Locally produced birds are typically only a small part of the fall population passing through. In those days, judging by the "sagging wagon" accounts of game abundance, the initial effects of drainage on wildfowl numbers must certainly have been of a magnitude that few would have considered worthy of worry. What was perhaps of greater concern at that time was the take by market hunting. The effects of this practice were not always permanent as is loss of habitat, but they were extremely visible. And they were considerable.

There may be no genuinely good reason for it, but history and posterity have not been as kind to the commercial hunter—the market gunner—as they have been to the trapper. Trapping has fallen into some disfavor in recent years by certain animal protection groups. But generally speaking, trapping has historically been looked on as a respectable activity. But the market hunting that ended in the early part of this century is now looked back upon as a vile and exploitive practice that greatly reduced some game populations and drove others to extinction.

Surely trapping made some harmful inroads into certain furbearer populations. Changing fashion, protective regulations, and the resourcefulness of certain furbearer species themselves saved them from inclusion on the "Endangered Species" list. It is possible that fur primeness dictates that trapping take place at a less critical time of year than did harvest of other animals taken solely for their flesh. Maybe it is partly this matter of legality that allows us to draw the line so sharply. Commercial harvest of furs by trapping is still allowed; therefore, it is legitimate. Those who sell the flesh of an animal are outlaws by statute. Therefore, those who practiced the profession of market hunting long ago are somehow retroactively as guilty as the modern poacher.

Another consideration enters the picture that at first glance may be missed. Competition developed between the sport hunter and the market hunter. Sport hunting was becoming an increasingly popular pastime in the late 1800s. It is not difficult to imagine the resentments that might erupt between a sportsman who occasionally shot game for sport and his own table and a man who spent most of his working hours for several months each year killing large quantities of game for sale to others. There is little evidence that there was any such situation where trapping was concerned. The ultimate purpose for small-time and big-time trapper alike was profit from sale of furs.

The sport hunter of that earlier era probably watched the wagon-loads of game heading for market and wondered if the days of his sport were numbered. At the very least, he probably observed that without the pressure of hunting for the markets, there would be a richer—or at least easier—harvest available for others like himself. Critics should remember that modern game management principles and the present-day reality of limited game populations were not a part of the era when ducks, grouse, and venison sold in the marketplace and were featured on the menus of the better restaurants. The bounty at first seemed endless. Market hunters of that era were not looked down upon by area residents. They were, in fact, respected by most members of their communities and enviously admired by several generations of barefoot boys growing up in rural midwestern communities. And yet, market hunting can be seen, with hindsight's advantage, as having ravaged game populations and driven less fortunate species to near or total extinction. The demand that created market hunting deserves blame more so than the men who practiced this profession.

The traditions of market gunning were going strong in the East well before the practice reached its full intensity in the Midwest. The heavily populated eastern region provided many ready markets even while the states of the Upper Mississippi were still in the process of being settled. Transportation was another factor that limited would-be market gunners' access to those few markets within the region; and its lack kept market hunting largely a local trade until the 1850s and 1860s. It was then that rail lines began spreading their iron tendrils into the region linking the major cities of the Midwest, and soon the entire region, to the east.

With the 1880s came artificial refrigeration and the advent of railroad refrigerator cars. This means of transport and preservation made market gunning and game shipment even more practical. Ducks, plover and sharp-tailed grouse could not only be shipped from rural rail communities, but they could also be stored for lengthy periods in freezers once they arrived at their destination. The markets of St. Louis, Minneapolis-St. Paul, and more distant points became terminal points for a great variety of game from Upper Mississippi River states.

Even without benefit of these modern advancements, a good man with a gun who hunted reasonably near to a market outlet, found a ready demand for his harvest. As early as 1833, St. Louis was a prominent point in the wild game trade in this region (Figure

11). In that year "in the St. Louis markets . . . two brace of ducks could be bought for 25¢" according to McKinley (1960). Prices may have varied greatly depending on demand and whether the ducks were of choice or common species. In 1850 it was reported that "ducks could frequently be bought for 50¢ per dozen" in the St. Louis markets. By 1873 mallards and wood ducks were bringing 25-50¢ per brace.



Figure 11. For the St. Louis Market . . . ? Photo courtesy of the Missouri Department of Conservation.

Some of the market gunners' daily bags of that era were astounding when one considers that their firearms were not repeaters and were not even breech-loading cartridge double guns. Most guns of this mid-nineteenth-century period were double-barreled muzzle-loaders. A Mr. William King (McKinley 1960) speaks of hunting on the Dardenne Prairie north of St. Louis in 1862, and noted that "the total count for the day's shooting scored 168 ducks . . . and 17 brant and geese, with one gun."

The prairie chicken was another sought-after bird among market gunners. They were present in parts of all five of the Upper Mississippi River states. Near market centers they were gunned heavily,

and as early as 1853 "market hunting was blamed for the extermination of prairie chickens on both sides of the Mississippi River within 30 miles of St. Louis" (McKinley 1960). Two years earlier Missouri's first game law was passed for their protection, allowing the taking of prairie chickens in St. Louis County only during five months of the year. In 1857 there were closed seasons on prairie chickens in Pike and Lincoln counties, but two years later the state law closing those counties was repealed.

Despite local scarcities, prairie chickens were still important game-market items. In December of 1873 at Sedalia, Missouri, they sold for 15-25¢ apiece. Prairie chickens were also involved in Missouri's first statewide game law. The year 1874 saw the closure of prairie chicken hunting from February 1 to August 15. By 1874 prices were \$2.75-3.00 per dozen in the St. Louis markets (McKinley 1960).

The region's widely distributed and highly sought big-game animal—the white-tailed deer—was also a regular item of commerce in midwestern wild-game markets. In St. Louis in 1833, "deer meat was always available, and a saddle (the hams, about 30 pounds) sold for a dollar," according to McKinley (1960). At the same time, deer hides were selling for about 75¢ apiece. One report dated 1850 notes the arrival in St. Louis of a steamer from Warsaw, Missouri, and included in its cargo were 300 deer hams. There were intermittent closed seasons in small local areas as early as the 1850s, but in most locales deer could be taken at any time. By 1878 venison was selling in markets for 5-6¢ per pound.

Lumber camps in the northern states, as noted earlier in this chapter, also made use of venison for the provisioning of their employees. This became a common practice in northern Wisconsin in the 1860s as lumbering grew in importance as an industry. According to Bersing (1966), by 1866 "commercialized or market hunting in the central and northern portions of the state began in earnest." The *Jaynesville Gazette* told of 3,000 deer being brought to Eau Claire in three months' time. By the 1870s deer meat was being sold for 5-6¢ per pound there. Venison was also plentiful in the Prairie du Chien market. In Barron County deer were plentiful to the point of being considered a nuisance by farmers attempting to grow grain.

The killing continued into the 1880s despite complaints voiced by sport hunters. What few laws there were—such as prohibiting out-of-state sale and those regulating method of kill—went un-

heeded. So too did the words of sportsmen. In 1885 it was estimated that 10,000 deer were shipped out of Wisconsin, many labeled "mutton." One hunter alone in the Eau Claire area in 1886 was reported to have killed three tons of venison.

Wild turkeys, an animal still common to Missouri but present in Iowa, Wisconsin, and Minnesota only because of special management programs, were also in the early game markets, selling commonly for about the same price as venison, 5-6¢ per pound. In the late 1870s ruffed grouse were also being sold and brought the same prices as prairie chickens, roughly \$2.75-3.00 per dozen. The much smaller quail brought 75-85¢.

Pigeons were sold for 10-15¢ per dozen in St. Louis at one point in 1878. But at times they brought as much as 45-65¢ dressed. They did not command high prices because they were small birds, and they were also extremely abundant. Though few—if any—realized it, this abundance would not only be reduced to scarcity, but to eventual extinction. The easiest explanation is to blame market gunning alone for the passing of this species. But the collapse of passenger pigeon numbers is a more complex matter than that. Other species have been reduced to small fractions of their former abundance, yet have bounced back. Settlement and habitat destruction—often one and the same—were a part of the reason for the passenger pigeon's demise. The gigantic flocks of these birds depended on vast acreages of mast-bearing trees, particularly oaks. With settlement, the vast quantities of food needed to support the unimaginably large flocks became less available. The fact that nesting pigeons often laid only a single egg, also added to the species' vulnerability.

Aldo Leopold, one of the most effective conservation voices of all time and often described as the father of game management, had a colorful if nonspecific description of the life and death of this species. He called it an "all or nothing" creature.

Yearly the feathered tempest roared up, down and across the continent, sucking up the laden fruits of forest and prairie, burning them in a traveling blast of life. Like any other chain reaction, the pigeon could survive no diminution of his own furious intensity. When the pigeoners subtracted from his numbers, and the pioneers chopped gaps in the continuity of his fuel, his flame guttered out with hardly a sputter or even a wisp of smoke.

But there can be no mistaking the fact that market hunting played a large role in this demise. Like many other species, the pi-

geons were hunted whenever they appeared, without regard for season or the birds' need to reproduce. Adult birds were slaughtered by net, pole, and gun with the young still helpless in the nest. The young, or "squabs," were a delicacy themselves. One central Wisconsin newspaper announced in May of 1871 that

next week will be the time for squab hunting. Get ready your poles to knock them from the trees. They are better and fatter than the old birds.

The same newspaper noted earlier that same month that the pigeons were

shipped to all places on the railroad, and to Milwaukee, Chicago, St. Louis, Cincinnati, Philadelphia, New York and Boston, being picked and packed in ice for the more distant points. From 10 to 30 thousand birds are forwarded daily, most of which have to be picked after the arrival of the trains at night, in many instances the work of picking and packing being continued all night.

Even as late as 1878 there were some large passenger pigeon nestings observed, such as one in that year at Petoskey, Michigan. But the end was nearing. Minnesota's last recorded nesting for this species was in 1895. Wisconsin's was in 1898 near Delavan. By 1909 none of these birds could be found anywhere, even though rewards were being offered for the discovery of even a single living specimen. It was really an anticlimax when on September 1, 1914, the last live passenger pigeon died at the Cincinnati Zoological Garden of old age. It was really the end of an age and of a species that was believed to have once made up 25 to 40 percent of all the bird life of North America!

Few records are available to show or even suggest the magnitude of game harvest during the market gunning period. However one table that attempts to total the amount of game killed in Missouri for the year ending March 1, 1886, may suggest at least a minimum kill, or perhaps the relative amounts of game killed. Presumably it was compiled from market figures (McKinley 1960).

deer	3,967
turkeys	8,942
prairie chickens	38,911
ruffed grouse	19,728
quail	61,902
ducks	165,469
geese	8,626

snipe	32,245
woodcock	311
plover	6,570
doves	8,129
wild pigeons	4,929
squirrels	4,920
rabbits	11,000

Market hunting was a business created by a demand for meat, both for home use and in restaurants, hotels, and similar places. Unlike hardware and durable goods that can be kept stored, there was inevitable waste of wild game. This was true despite the invention of artificial coolers and freezers and improved transportation. A note from the *American Field* of 1886 mentions that mallards sometimes sold for 50¢ per dozen, and that "hundreds of bushels were often dumped into the Mississippi River because of spoilage" (McKinley 1960).

Waterfowl gunning for the market seems to have the most tradition and romance attached to it, perhaps because waterfowl hunting is a very tradition-oriented sport that continues to this day. With the end of market hunting, little changed in waterfowling other than the sale of game, excessively high or no bag limits, and the preference of market hunters to shoot birds on the water. Many of the old market gunners turned to guiding hunting clients, and an old era merged into a new one.

The fortunate waterfowlers of the market era lived on or near a large lake or slough such as Heron Lake in southern Minnesota, Horicon in Wisconsin, Forney's in Iowa, or some of the Mississippi River bottoms as well. Such gunners might set out 100 to 300 wooden decoys each day, pick them up each night, care for 50 to 75 birds at day's end, and reload shells for the morrow after. This routine might be followed from August or September through ice up and again in spring from the birds' arrival until late April.

Others who did not live near large, dependable duck-producing waters had it tougher. Many walked a circuit of lakes and sloughs or drove a horse-drawn trap, stopping at intervals to stalk and shoot resting birds. Some—including those who walked—made a circuit of 15 to 20 miles each day, carrying all their day's provisions with them and the bagged game as well. More so than the "big-rig" gunners, the itinerant sort of market hunter was likely to end his day with a mixed bag of shorebirds and upland birds as well as waterfowl.

The diary of Eli Boudrye—a southern Minnesota market gunner—lists prices he received from several local buyers in 1895. By that time, the more sought-after ducks were bringing considerably more than the 50¢ per dozen they commanded in St. Louis in 1886.

	<i>per dozen</i>
Mallards, redheads	\$2.50 (early season)
and canvasback	3.00 (late season)
common ducks	.60
bluewing teal	.75
"bb's" (small	
assorted shorebirds)	.08
sandpipers	.10
yellowlegs	.24
greater yellowlegs	.60
golden plover	.75
"grass plover"	.60

These were the final years of market gunning. Legal interstate sale of wild game ended in 1900. Very shortly thereafter, sale of all game was outlawed, though some went on because funding for enforcement of the new regulations was lacking. But that would come too, in 1916 and none too soon, for a resource whose populations were reeling—pressed by habitat losses on the one hand and heavy commercial harvest on the other.

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### 3

## Intensified Use of Wildlife, Land, and River Resources

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Sport hunting, like settlement and subsequent land development, was a phenomenon that followed an evolutionary course. It quite naturally followed the development of an economic background in which each man did not have to rely solely on his own efforts to fill his varied needs. Sport hunting came with the diversification of employment opportunities and changing demographic residence patterns. It became common practice for most people to buy their food from a man who either grew it, raised it on a farm, or shot it and sold it in the wild-game marketplace.

The hunting heritage was shared by nearly every family that settled in the Upper Mississippi region in its years of growth and expansion. The days when hunting was both prudent and profitable were not far removed from even the most urbanized citizen of that period. It's hardly surprising then that wage-earning men pursued hunting as a form of recreation as it was now no longer a necessity. Aldo Leopold (1929), perhaps the best known and most revered of modern conservation leaders, may have understood better than most the motivations and values that became the core of sport hunting. "In civilized peoples," he said, "the economic base shifts to tame animals and plants, but the culture nevertheless retains parts of its wild roots. There are cultural values in the sports, customs and experiences which renew contacts with wild things." Leopold saw particular value in those experiences such as hunting "which remind us of our distinctive national origins and evolution."

Just as the economic base broadened and diversified in the East well before it did so in the Upper Mississippi region, so also did sport hunting's evolution begin there earlier than in ours. By the early 1800s there were hunting and fishing clubs formed and functioning in the East. It was not many decades afterward that similar clubs could be found in the Upper Mississippi states. The North St. Louis Hunting and Fishing Club was organized "away back in the sixties" (Ellis and L.A.S. 1905). Other clubs developed in the St. Louis area and near other population centers along the river toward the end of the 1800s, and on into the early twentieth century. Lands along the river or nearby would be bought or leased and often a clubhouse built for members' use. Some of the clubs were even clever enough to call themselves "hunting, fishing and literary clubs," so that they could incorporate under certain education laws. However there's precious little evidence their literary endeavors ever came close to matching those of hunting and fishing (Figure 12)!

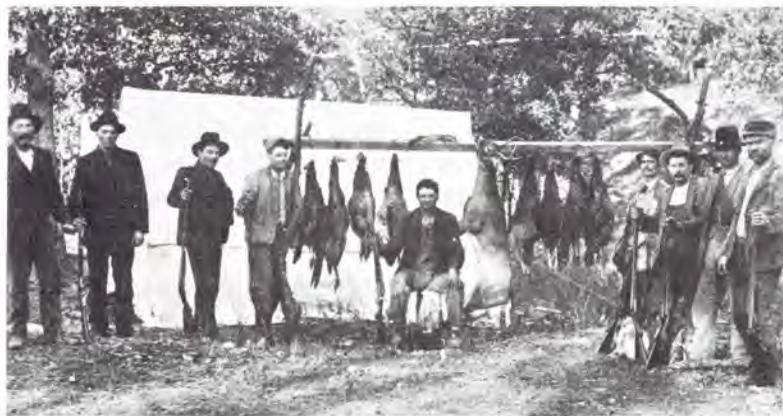


Figure 12. Market hunters? Probably not, but a grand harvest by "sports" of the day. Photo courtesy of the Missouri Department of Conservation.

Today we like to think that modern hunting ethics have evolved to a point where the weight of a sagging game bag is not of paramount concern. In the early days of sport hunting in the latter nineteenth and early twentieth centuries, the amount of game harvested seems to have been almost the only scale on which success

was measured. Game was still relatively abundant almost everywhere but in the most populated areas, and the sportsman had the market hunter to look to for his example. Little wonder then that the numbers of game birds and animals reported harvested in sport hunting's early days were sometimes astronomical.

Witness the following from McKinley's chronology (1960): "At a reunion of the St. Louis Gun Club, the two 'sides' shot 425 and 437 jacksnipes each: an average of 34 and 37 birds per shooter." The same emphasis on numbers could be found elsewhere. At Dardenne Lake in St. Charles County, Missouri, in three days in late October 1880, six men killed 463 ducks (410 of which were mallards), 21 jacksnipes, and 4 geese . . . at Kansas City in late September 1881, two men in three days bagged 24 dozen teals and one woodcock, and four other men killed 145 teals in one day at Missouri City.

On the Mississippi River, near Clark County, in April 1882, four men killed 232 jacksnipes in less than four hours. Bugle Bill of Norborne bagged 12,987 game birds from September 25, 1876, to January 1, 1882. In about 17 days of shooting in April 1881, he had taken 1,201 jacksnipes, a friend, 1,433; "We have killed 60 hawks since October, 1881," he reported in January 1882. The above references are all from McKinley's chronology (1960).

By modern sporting standards—or what we think they should be—these records of early hunting may leave us wondering how such activities could ever have been called sport (Figure 13). But the early sport hunters lacked several things that have shaped modern sport hunting. The most obvious lack was that of the restraint of regulations. What few regulations there were during the latter part of the nineteenth century did little to restrict how many game animals or birds could be taken, or how.

Hunters in the Upper Mississippi region were aided significantly in taking more game by the marked improvements in weapons available to them. This and other bits of early technology are described in the quotes from Braunworth and Mackey (1909):

"During the twenty years after the first settlement upon the Mississippi in this locality (Muscatine), it should be borne in mind the accoutrements of the hunters were rather crude. The flint lock gun was in use and no shot was on the market. The hunter purchased his lead in bars and with the aid of a hand mold manufactured his own leaden missiles. In the latter part of these years and in the early sixties, gunsmiths were kept busy changing the flint lock guns,



Figure 13. "A day's bag." Photo courtesy of Area Research Center, University of Wisconsin, La Crosse.

placing tubes in them and attaching the new mechanical arrangement for exploding the percussion cap.

An advertisement in the *Iowa Territorial Gazette and Advertiser* of May 15, 1841, under caption of "Gunsmithing and Lockmaking," says: "Percussion powder, flints, gun worms, rifle powder, lead and almost every article usually kept in such establishments, kept constantly on hand, L. W. Babbitt."

We now start a new era, the Seventies of the last century, marked by the advent of the breech loading shotgun." Guns mentioned in the narrative include "number eight dailey" and "Parker gun."

Coming down to the Eighties, the hunter in the Illinois bottom found more competition, better guns, fewer guns and scarcely any geese. Bill Braunworth got many ducks with his Remington gun, but was never satisfied until he got a 'Parker' and "pulled them out of the clouds."

The hunter of wild game in the Illinois bottoms in the Nineties had great advantage over his predecessors. The "pump gun" had come into use and with it . . . "Smokeless powder" aided him, not a little, in keeping his hiding place concealed from the game, while

both wooden and canvas decoy ducks, sneak boats, and bow facing oars could be purchased. The "duck call," an invention of Mr. Fred B. Allen of Monmouth, Illinois, who hunted in royal style with a large party in these bottoms we speak of, could coax the ducks flying over to come within range.

In the 1890s game was not considered to be in great abundance. During some of the years of the Nineties very few ducks, or in fact few if any wild game followed the Mississippi in their migratory flights. It was said by hunters of this period that they had found a new route, but this could not be the case for in later years they were again more plentiful (Figure 13). Many times the boys would spend a whole day in the bottoms and could not bag a bird.



Figure 14. "A Goose Hunt Deluxe" at Brice's Prairie near La Crosse, November 1927. Note the repeating shotguns commonly in use at that time. Photo courtesy of Alvin Peterson, Onalaska, Wisconsin, and the Area Research Center, University of Wisconsin, La Crosse.

Imagine that! Not only did they have "bad" days, but they even blamed it on a "new route." Still today, some Mississippi hunters blame a new "western" route for a supposed drop in fall numbers.

Although we may like to think that ethics are independent of bag limits, they can have an indirect relationship on each other. When bag limits are low—this may direct the sportsman's attention away from a preoccupation with numbers and more toward

the other intangible elements of the hunt. Early sport hunters had precious little of this influence though game had its times of scarcity then too (Braunworth and Mackey 1909).

All evidence points to a lack of a standard for measuring success or prowess other than numbers of animals taken. We may prefer not to recognize it, but competitiveness is even today a part of sport hunting, whether it be competition with other hunters or with the absolute standard of a legal bag limit. If breaking par at golf or breaking 25 straight at skeet are worthy goals, why not a limit of game? Thinking back to the late nineteenth century when the sky was figuratively the limit, the harvest excesses recorded here are more easily understood.

Today there is peer pressure for sportsmen to observe both written and unwritten sporting ethics. These ethics tend to emphasize taking game fairly, being concerned with the welfare of all species as a whole and the habitats where they live, strictly adhering to game regulations, and so forth. The pressures felt by the early sport hunter often led him in the opposite direction.

Today's hunters also have a literary heritage that in many cases stresses respect if not reverence for all wildlife and responsibility for its continued welfare. The literary heritage of the early sportsman's time had not influenced him very far in this direction. Just as we are products of our time, so too was he. Though the prodigious bags of game the early sportsman accounted for would embarrass most modern hunters, there was little pressure on him to harbor any feeling of remorse over his deeds.

If the need for some kind of restrictions on the harvest of wildlife was not apparent to a great many, a conscience was developing. It was a sport hunting conscience relating to what was proper and fair in the killing of game, and what was not. As early as 1875 the Society for the Prevention of Cruelty to Animals was raising its voice against some sporting practices of the day. In that year in St. Louis the widely known shooter named Captain Bogardus was arrested on the complaint of the society, for trapshooting live passenger pigeons (McKinley 1960). Bogardus was never tried for the alleged offense, but the action testified to the fact that the exploitation of wild game was beginning to draw attention.

Even though these early sportsmen of the times might themselves be guilty of excessive harvest in the hunting fields, they drew quite sharp distinctions between themselves and those who shot for the markets. The Missouri Sportsmen's Club—"to which

every gentleman belonged" it was said—denied membership to anyone who shot professionally for the market. Sentiment was building against exploitation for profit.

Quite obviously, sportsmen were motivated somewhat by self-interest. In a sense, they were competing with market gunners for the same game. They were also competing with the consumers of wild game who dined in restaurants or bought for personal use from the city markets. The impact of these consumer dollars was a strong one, both economically and politically. It would continue to be an important force until after the turn of the century.

But if sportsmen had self-interest in mind in their early conservation efforts, they also had foresight and a concern for long-term availability of game. They were willing to place restrictions upon themselves as well as the market gunners. The Missouri Sportsmen's Club was given much of the credit for bringing about that state's first statewide game law (McKinley 1960). Passed in 1874, it was entitled "An Act for the Preservation of Game, Animals, and Birds." Its effects were to close various hunting seasons for a portion of the year, to afford protection for game animals, particularly during their breeding seasons. Grouse and quail seasons were closed eight months, turkey five and one-half months, prairie chickens six and one-half months, woodcock six months, doves seven months, and deer seven and one-half months.

Waterfowl were noticeably absent from this law. Perhaps this was because they were a migratory species whose true abundance was more difficult to determine or because of their importance as a commercial item. However, despite the economic importance of waterfowl in local markets, newspapers in the important market city of St. Louis were among the most vocal in denouncing spring shooting of waterfowl. In 1883 the St. Louis *Globe-Democrat* "strongly opposed spring shooting, claiming that a cold spell in the spring of 1882 had caused wildfowl and snipe to remain until so many were shot that the crop of 1883 was hurt" (McKinley 1960).

In 1886, the St. Louis *Republican* also opposed spring shooting of waterfowl. In that year several editorials appeared in an issue of the *American Field*—a most respected sporting publication—condemning spring shooting of ducks, as well as killing birds for fashion and selling of game killed out of season (McKinley 1960). Some sportsmen hoped to retain the privilege of spring waterfowl hunting by eliminating market gunning or limiting its practice, but by

and large, sportsmen of this day seemed willing to accept limitations on their own activities if market gunning was likewise restricted.

The concept of fair chase became a strong element among the growing fraternity of sport hunters. Snares, nets, traps, and night hunting were early targets for "outlaw" status among this group. It must be recognized that judgments of what is sporting and what is not vary among sportsmen, influenced by heritage and background.

There were early regulations aimed at ensuring that the hunter did not have every possible advantage in his pursuit of game. Citing Wisconsin, that state in 1897 made it unlawful for deer hunters to kill their quarry while in the water or on ice. That same legislature also provided the state with its first bag limits. It had taken 24 years—since 1873—after the state's first organization before the preservation of game was founded, before this most obvious of protective tools came into use. It was also slow to be used elsewhere in the Upper Mississippi states.

Sportsmen were the driving force behind these early game management efforts. Most of these efforts were directed at controlling harvest and protecting breeding stocks. Wisconsin was again a leader in efforts made to aid waterfowl. These included legislating against spring shooting in 1887, and in the same year prohibiting the use of open-water blinds. The latter regulation has become a common one in waterfowl hunting, offering ducks protection and rest on the open waters of lakes and large sloughs.

In the days before the management of waterfowl came under federal government control, state laws were the only ones that might ensure some elements of restraint in harvest. One particularly questionable waterfowling practice was the target of a 1909 Illinois bill. It made the baiting of waterfowl—enticing them with food placed by the hunter—illegal. Other devices that aided the waterfowler were later banished, perhaps the most notable being the use of live call ducks. These were the forerunners of the modern duck call for some hunters, even though artificial duck calls were in use before the live callers disappeared. The call ducks were kept and cared for throughout the year, and during the hunting season were tethered out in open water near the gunner's artificial decoys. Sometimes the "caller" would sit on a stool or platform fastened to a stake pushed into the lake or slough bottom. Thus it could rest periodically during the long hours it sometimes had to

put in. The term "stool" in reference to artificial duck decoys is believed to have originated in this way.

There were a few more dramatic experiments in game management efforts in the early years that were given at least a brief trial while sportsmen and game managers were searching for tools to husband the wildlife resources. One that would seem bizarre by today's sporting standards was a Minnesota statute, enacted in 1911 and persisting for a short while, that prohibited the use of hunting dogs for taking game. Sportsmen of today consider the use of a trained hunting dog to be a conservation measure and a symbol of the best in sport. In this period of groping for standards, some briefly felt that it was unfair or unsportsmanlike for hunters to use the instincts of one animal to subdue another.

Many modern hunters would like to take at least a temporary trip back into the early days of sport hunting, a time that seems full of romance and abundance. Some longtime Upper Mississippi River residents were there, and their recollections make that past no less appealing. Henry Dickinson (personal communication 1980) was born at Sabula, Iowa, in 1907, and spent much of his life on or near the river. Most of Henry's hunting was done before 1930.

I have done no market hunting, but my Father John Dickinson and his brother Charlie did do quite a bit. My father and Charlie were two of the best shots in the area, and were barred from the shooting matches. If dad wanted to get 10 ducks, he didn't need to take but 10 shells along.

I started hunting with a 17 gauge single shot. I loaded my own brass shells for this using black powder, which made plenty of smoke. I did a lot of spring season hunting when it was legal. We used to have a 25 bird limit. I remember one time when the three of us went out on a spring day and came home with 75 mallard drakes. We just stood in the timber on Railroad Island near Lainsville, and shot them as they flew over in small bunches of two or three. I guess you would call that my greatest duck day.

We also hunted the river in a scull boat, and used live decoys when they were legal. Our favorite spots were Browns Lake, Round Lake, Railroad Island, and Scarbrough Lake. Our farm bordered the river and we did some cornfield hunting when they came from the river and lakes to eat. We did also hunt some deer, but other than ducks, dad and I were most partial to fox hunting with two or three good fox dogs. It was good fox territory. I used either BB shot or a 25-20 Savage as fox guns. Dad also used a .303 Savage as well as his 12 gauge automatic.

Henry has done little hunting in recent years, in part due to advancing age, but also perhaps due to a hunting scene much changed from that earlier day. "Really, I'm a hunter of the past," he concludes.

The modern sportsman has come quite a distance from those days, in the equipment and other devices he uses to pursue his sport, in the availability and abundance of game to hunt, in regulations he must abide by, and more. Some things have not changed too much. The primary value of hunting as a recreational pursuit lies in the contrast between it and the daily routine of our lives, the skills that must be mastered, and the challenges to be met.

Aldo Leopold was aware of this change but he feared that excessive mechanization and preoccupations with gadgetry and convenience threatened to dilute important values or destroy them altogether. In the case of some sportsmen, his fears were substantiated. For others who truly appreciate the best aspects of hunting as a sport and respect wildlife itself, sport hunting is a spirit-renewing endeavor and a tangible link with the past (Figure 15).



Figure 15. A proud hunter of a bygone era.

Early commercial use of the Upper Mississippi River was primitive compared to what would come later, when a burgeoning

economic region hit its stride. Raw materials and imported goods would flow upstream under the momentum of high-powered tows. Farm products and industrial goods would in turn flow downriver to markets elsewhere. The river would grow up, and rapidly.

In 1878, work began to establish a 4.5-foot navigational channel between the Missouri River and Minneapolis. As this great artery of commerce—the Upper Mississippi—began carrying more and more of the regional economy's life blood, shipping interests asked for something more than the 4.5-foot channel. And they got it. The channel was deepened to six feet. More was planned for the river than just dredging and wing damming designed to maintain channel depth. More was needed to prevent shoaling in the channel and hindering of commercial river traffic.

A decision was made in 1930 that would change forever the character of the Upper Mississippi River. In that year Congress authorized the U.S. Army Corps of Engineers to begin the nine-foot channel project by means of locks and dams, supplemented by dredging. On the stretch of river between Minneapolis-St. Paul and the great muddy Missouri River, there are now 28 dams spanning it.

The Mississippi is still a river of flowing water, but with the construction of the lock and dam system, the river was transformed essentially into a chain of lakes (see Figures 16-18).

It is a stretch of interesting and varied topography, but the configuration of the watercourse is now largely controlled and defined by the series of dams. Each dam, separated from the next by a distance of from 15-30 miles, creates a flat pool several miles in length. The partial impoundment of the river has brought, and is bringing about, many distinct changes in the water's topography, and hence in the conditions which make up an environment for fish and wildlife (Greenbank 1945).

An excerpt from Carlander's *History of Fish and Fishing in the Upper Mississippi* (1954) demonstrates one of the radical changes in the river since the advent of the dams:

One of the effects of the dams has been an increase in the (river's) permanent water area. The impoundment above the Keokuk Dam covers sixty square miles at low water stages; before the dam was built there were only 36 square miles of river surface at low water. Since impoundment, the difference between the water area at high and low water stages has decreased. Coker in 1930 reported that



Figure 16. A view of Genoa, Wisconsin, in 1900 looking north along what will become Wisconsin Highway 35. Note the log raft in the upper left-hand corner and the route of the railroad between Genoa and the water's edge. Photo courtesy of Genoa State Bank.



Figure 17. A view of Genoa, Wisconsin, in 1939 looking north along Wisconsin Highway 35. Comparing this photo to Figure 16, note the higher water levels provided by Lock and Dam No. 8, displacement of the railroad tracks and inundation of the islands in the upper left-hand corner of Figure 16. Photo courtesy of Genoa State Bank.



Figure 18. A view of Genoa, Wisconsin, in 1978 looking north along Wisconsin Highway 35. Comparing this photo to Figure 17 note that some of the area which was previously inundated to the left of the highway (left center of photo) is now filled with sediment. Photo courtesy of Genoa State Bank.

Keokuk Lake had only four square miles more water area at high water level than at low, after impoundment. Before Keokuk Dam was built, the difference in area at high and low water levels was 18 square miles.

The changes in the river's character had a direct and immediate effect on the fish and wildlife resources associated with it. Impoundment of the river, thus maintaining a higher water level all year long, has eliminated some of the seasonal low-water marshes that were havens for waterfowl, furbearers such as the muskrat, and numerous other mammalian and avian creatures that thrive in marsh environments. Yet by the more constant high water levels, some new wetlands have also been created. With some species at least, there appears to be a trade-off of losses and gains.

The Illinois Department of Conservation's notes (1967/68) on several counties provide an example. In Jo Daviess, Carroll, and Whiteside counties along the Mississippi

the number of ducks and geese passing through this area during migration has decreased considerably. Physical changes in the Rock and Mississippi rivers have reduced their value to waterfowl, and

large numbers of ducks and geese no longer stop to feed and loaf. After resting a few days, they move south.

In contrast the opposite is said of the Rock Island, Mercer, and Henderson county stretches of the Mississippi, in terms of their attractiveness to waterfowl.

The establishment of a lock and dam system creating pools in the Mississippi River in the late 1930's was a blessing to waterfowl, in that many backwater sloughs containing desirable waterfowl habitat were created or enlarged.

However, the outlook for these new habitats and their futures was not altogether optimistic. The Illinois Department of Conservation's (1967/68) notes on these counties add that

it is unfortunate that these areas are destined to die a slow death as a result of the siltation that occurs, filling the marsh until it is no longer a wetland.

The Mississippi is still a major migration corridor and concentrating funnel for waterfowl. In the fall at certain times one can view thousands upon thousands of canvasbacks on some of the river's pools. Scaup and ringnecks also use the river extensively. In terms of its ability to provide food for waterfowl, the impounded river perhaps serves diving ducks better than in earlier years. This is at least true in the expanded areas of deeper water, where aquatic life is more available to divers than to the puddle or dabbling ducks. Backwaters and river-bordering marshland host substantial numbers of mallard, wood duck, teal, and other puddle ducks (Figure 19).

Other wildlife species, those dependent upon fish for part of their diet including raccoons, river otter, and so forth, have fluctuated in abundance with the fish that inhabit the river. Carlander (1954) noted that

the change in the river current probably has been more important in affecting the fish and fishing than has the increase and stabilization of the water area. The current in most of the river from St. Paul to Alton, Illinois, has been greatly reduced. As the current slows, the silt settles out, covering sand and gravel bars which are essential for some species of fish, mussels, and of insects, crustaceans, and other organisms which are important as fish food.

Enumerating the changes in wildlife species composition due to changes in fish populations brought about by dam construction would be quite difficult because the changed character of the river



Figure 19. Impoundment favored creation of more shallow water marsh, especially in the midsection of the newly created "pools." Note the railroad embankment in the background. Photo courtesy of the Missouri Department of Conservation, Don Wooldridge, photographer.

directly altered the adjacent lands themselves, compounding the effects.

Wildlife species changes due to river-bottom habitat alteration alone have been reliably documented. This is particularly true along stretches of the Upper Mississippi where complicating factors from man's activities are few, such as along the 284-mile Upper Mississippi River Wild Life and Fish Refuge, stretching from the Chippewa River in Wisconsin to Rock Island, Illinois.

Some wildlife species have become less abundant. Quoting from Green (1960):

The high semi-dry bottoms at one time held higher populations of skunks, badgers, foxes, rabbits, etc., than occur at present, as the habitat was more suitable for such species. Prairie chickens once used the bottomland meadows, but with the elimination of such areas, prairie chickens have vanished.

Other species were able to adapt without much drop in abundance to the environment that had changed from timbered bottoms, seasonal marshes, and bottomland meadows, to an area of semistabilized water levels. Here, though some spring flooding occurs as it did in the past, the bottoms do not dry out in summer. Deer were plentiful before the dams, and they still are today, in

an environment that includes not only bottomland timber but also marsh and semi-aquatic habitat instead of the original wooded islands and dry marshes. Muskrats adapted too, and instead of the bank-dwelling rats that were present before water stabilization, the area now contains a predominance of house-dwelling rats.

Skunks, badgers, and rabbits have been reduced in number because of flooding of suitable habitat, Green's report indicated. But increases have been seen in the populations of raccoon, beaver, mink, and muskrat. Otters have increased in some states to the point where trapping seasons were established. Elsewhere along the Upper Mississippi, outside the refuge, similar changes in abundance have taken place. However, in many such places, in competition with man's designs on the river, wildlife has not fared quite as well.

One of man's designs that has been considered in recent years is the further deepening of the Mississippi's channel to 12 feet. According to proponents, this development would enable commercial interests to use larger tows and barges to haul additional tonnage up and down the river. Other associated waterways have also been mentioned as being considered for channel deepening. In addition to the Mississippi itself from Minneapolis to the mouth of the Ohio River, U.S. Army Corps of Engineers studies have mentioned portions of the Black River in Wisconsin, the Minnesota River, and the St. Croix as candidates for deepening.

The deepening would be accomplished by dredging an additional three feet from the bottom of the main navigation channel, increasing water depth in the river's pools by controlling water flow through the dams, and using dikes to divert water flow. The raising of water depth and dredging have been generally considered to have the most potential.

There are problems with either approach. Additional dredging will increase the dredged spoil disposal problem (Figure 20), something that has been a problem with the nine-foot channel. Raising the Mississippi's water level would result in the destruction of wildlife habitat, possible interference with road and rail lines at some points, and adverse effects on some adjacent agricultural land due to water seepage. Hopefully, when decisions are made, wildlife values will be given the sincere and serious consideration they deserve. It is this consideration that the wildlife resource has not always received in the past.



Figure 20. Valuable habitat has been lost due to dredging activities used to maintain the nine-foot navigation system. This photo shows a large containment basin built to confine the dredged sand in a localized area rather than allowing the sand to spread out, "choking off" any additional habitat.

Perhaps more threatening to wildlife along parts of the Upper Mississippi are the forces of land development. Conversion of wildlife-producing lands to agricultural, industrial, or residential uses continues to threaten the remaining populations. Bruce Klein, Fish and Wildlife Service biologist based at Rock Island, Illinois, pointed out (personal correspondence 1980) that the upgrading of levees by the U.S. Army Corps of Engineers has provided added encouragement to such land conversions. Levees are being strengthened to the point where the corps can declare them safe from breaching for 100 or even 200 years. With such assurances to provide incentive, Klein noted that much land behind the levees is being bought up for commercial purposes.

"A classic example is the Fulton Flood Control Project upriver," said Klein. "With the levee not quite completed yet, a lot of industries are coming in and buying up land in anticipation of future development." Though he notes purchases being made for potentially diverse commercial land uses, Klein sees most as being in some way related to agriculture, such as fertilizer plants and the

like. In this case some of Illinois' few remaining wetlands as well as some timbered land along the Upper Mississippi are threatened. Some easements to prevent draining, burning, or building have been secured on modest acreages within such projects. On the 9,000-acre Fulton project, Klein noted that about 400 acres had been secured by easement.

Such flood-protection-guarantee projects as Fulton not only encourage development of river-bordering lands, but also cause land prices to climb dramatically in many cases. Protecting such lands often becomes too costly, and encourages landowners—including farmers—to sell out for handsome profits, to potential industrial developers.

Ken Babcock, assistant chief of the Wildlife Division, Missouri Department of Conservation, expressed (personal correspondence 1980) the opinion that agriculture presented the greatest threat to wildlife habitat along the lower reaches of the Upper Mississippi. He noted, however, that if the present nine-foot navigation channel is deepened to 12 feet, industrial threats to river habitat will be greatly magnified.

Babcock identified some of the habitat types threatened by agriculture as "certainly the bottomland hardwoods, and the associated river chutes, the old river channel slot lake type environments, and all the associated wildlife species that go with it." Waterfowl, deer, squirrels, grouse in some cases, and other wildlife species are potentially threatened.

"Of course some of the small game and other wildlife associated with the more open area are being further threatened, in that agriculture is going from an operation of a series of small farms, to large blocks of single ownership or single unit operations," Babcock said. It's not just losses of habitat as we know it today, but it's a change in the whole agricultural picture. The old agriculture on the 40-acre basis probably is beneficial to wildlife, even if it meant the loss of some of the native-type habitat. It certainly did increase the edge effect and the wildlife potential. But now we're going into the big, multiunit type farms, and this is certainly to the detriment of wildlife.

The Upper Mississippi is no stranger to pollution. By the 1920s parts of it were found to be so degraded that many species of fish were absent from these waters. Wildlife species such as raccoons, mink, otter, and muskrat, perhaps eagles and ospreys too, suffered indirectly from the poor water quality, for they depended on

the animal and/or vegetable components of a healthy river for their well-being.

Opinions today seem to picture the river as being less polluted than in previous years. Klein (personal communication 1980) notes that most of the old "river rats"—those who lived and worked near, or on, the river for many years—agree. Babcock (personal correspondence 1980) points out that public awareness and indignation have had a lot to do with this phenomenon of improvement. Laws and restrictions on industrial disposal and chemical use on farmland have helped considerably, in his opinion.

Perhaps a more insidious pollutant than chemicals and sewage is the earth itself. Soil has always been carried by the river's currents. Timber cutting, excavation, and some agricultural practices along the river and its tributaries have magnified the problem. Since the construction of the many navigation dams on the Mississippi, the current has slowed, allowing suspended silt and sand to drop out more readily, concentrating where the current is slowest, particularly behind dams.

Quoting from the work of Ott and Fremling (1969):

The sand in the backwaters is augmented by the decaying remains of algae and other life forms which have proliferated because of fertilization by upstream municipal sewage.

Agricultural fertilizers have no doubt contributed significantly as well.

The sand, silt and eutrophication products are apparently slowly raising the bed of the Mississippi River.



Figure 21. A river rich in diversity supports wildlife in equal diversity.

This is indicated by the huge spoil heaps thrown up along the river by the Corps of Engineers' dredges. Most duck hunters, trappers and fishermen have noticed the gradual deposition of sand and silt. While perhaps not as immediate a problem as pollution by municipal and industrial waste, pollution by sand and silt presents a far more intractable and irretrievable situation.

The comments of these and others point out one very clear fact. That is, if we wish to have a clean, beautiful river with healthy species of wildlife to complement it (Figure 21), we'll have to maintain a constant vigilance. We'll have to do what can reasonably be done to protect the quality of the river's water and protect and enhance as much river-bordering habitat as is economically feasible. That will take public support and public money.

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## 4

### Wildlife Management's Beginnings: Recognizing the Need

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Wildlife management is a comparatively modern term. In fact, intentional resource management of any kind was a concept unknown in the Upper Mississippi region for the eighteenth and nineteenth, and even the early twentieth centuries. It's not too hard to understand why this was so, for even the briefest of contacts with histories of settlement make it clear that the major task of most pioneering citizens was securing a living from land thought to have unlimited resources.

The resource we're most concerned with here, wildlife, was probably one of the last to be found worthy or in need of management. Over the years such a tradition of harvesting wild bounty from the land had developed that many came to consider the harvest of wild game a God-given right. Not only pioneering families in this region but also subsequent agricultural life-styles found wild game a staple that supplemented crops and livestock.

In those early days there was venison almost always near at hand in an adjacent forest or at the edges where woodlot or prairie met farm fields. There were prairie chickens, sharp-tailed grouse and in places ruffed grouse. Wildfowl in almost uncountable numbers were either resident during the open water months or passed through in migration, providing another supplement to barnyard fowl.

Little did our not-too-distant ancestors expect or comprehend—most of them—that they were squeezing wildlife from two sides, gradually "taming" wild land that was needed by wildlife for

homes and at the same time putting direct pressure on wildlife numbers by hunting. With adequate habitat many wildlife species can withstand even sophisticated gunning pressure provided there are sensible regulations on when and how much can be harvested. But right up to and beginning in the twentieth century there were few restraints on either end. Secure homes for some species vanished, and for most others were diminished. The regulations aimed at putting a ceiling on the killing of game were few, often inadequate, and often not too rigidly enforced.

Perhaps in a bizarre sense the wanton and poorly restricted taking of wild game brought the needs and problems of wildlife into sharp focus when time still remained to do something about wildlife's most critical need, habitat, before the character of our lands had changed so greatly that for many species it would be too late.

As so often happens with social and political movements, so also are many of the Upper Mississippi region's early conservation leaders and proponents overshadowed by history. The great recognition goes only to a few. Perhaps the best known of our region's champions of a plentiful wildlife legacy was the short, little man with the big message and a wisdom and foresight much larger than his physical stature. Aldo Leopold was a biologist and a professor at the University of Wisconsin. Leopold followed in the conservation footsteps of such national notables as George Shiras, who first established the principle of federal responsibility and control over migratory birds, and President Teddy Roosevelt, Boone & Crockett Club founder and a turn-of-the-century conservation pioneer.

Leopold belonged in such tall company because he achieved truly national stature, not by chance but by accomplishment. He was a member of a specially selected committee in the 1920s that prepared what came to be called the American Game Policy. Leopold was chairman of this committee, whose work was sponsored by the American Game Association. Leopold and the committee's vision for the future of wildlife are eloquently spoken in the opening paragraph of the group's report:

Demand for hunting is outstripping the supply. If hunting as a recreation is to continue, game production must be increased. Where? How? By Whom? These are the questions with which a game policy must deal.

And according to Arthur S. Hawkins (personal communication 1980), now a retired Mississippi flyway waterfowl consultant with the U.S. Fish and Wildlife Service:

The committee recognized that hunting regulations alone would not solve the supply problem, because it takes suitable habitat to produce wildlife.

It also recognized that to select the right kind of management and to apply it skillfully requires biological facts and trained personnel. In short, it recognized the need for game management as a new profession. And it emphasized the need for understanding and harmonious cooperation between sportsmen and other conservationists.

Leopold was also the first to publish a comprehensive and perceptive treatise on the stewardship of wildlife resources in a book entitled *Game Management* (1933). For this and for additional books and articles on the subject, Leopold justly came to be known as "the father of game management." Leopold was also one of the first genuine ecologists, sensitive to and eloquent in promoting the concept of the interdependences of all living things.

As one might expect, early lawmaking attempts in the Upper Mississippi states that sought to give wildlife a helping hand were local in nature, often dealing only with one or several counties in a state. This was the case with what appears to have been the first game law in the five-state region, one that applied to St. Louis County, Missouri, alone. Passed in 1851, it allowed the hunting of deer, prairie chicken, and wild turkey for five months, ruffed grouse and quail for five and one-half months, and woodcock for seven months, all seasons commencing on what must have been an explosive Fourth of July. This pioneering law also forbade the selling of wild game flesh during the closed season. Wisconsin's first game law also was passed in that year, providing for the first closed season period ever on deer, prairie chicken, quail, woodcock, and ruffed grouse. Illinois joined these states two years later. In 1853 the state's first recognized game law applied to 15 counties, protecting deer, prairie chickens, quail, woodcock, and ruffed grouse (the law called them partridge) during the period from January 1 to July 20. There was still a year-round open season on ducks, with no possession limit.

One of the first legislative steps limiting market gunning was taken in 1869 in Illinois, in which several designated counties were named as being off limits to the killing of game for the market.

And, a law which only in recent years has been enacted in some of our states, was passed by this state in 1871 requiring hunters to have written permission to hunt within the enclosed lands of another.

Laws, of course, require enforcement. Not unlike its neighboring states, Illinois may have passed game laws, but did not necessarily provide the means for enforcing them. A number of laws were passed in this state for the protection of game, but did not provide for the appointment of wardens and define their powers and duties until 1885.

Beyond these very localized and often not-so-effective early game laws, there were also some efforts toward broader protection for wildlife through legislation. One came in 1886 when a group calling itself the National Association for the Protection of Game, Birds, and Fish met in St. Louis. There they discussed and argued and made recommendations for uniform laws east of the Rockies; seasons and bag limits for certain species; the outlawing of snares, nets and traps; complete protection of songbirds; and abolition of night hunting. The group also recommended unified fish and game commissions with the power to prosecute violators, and wardens to be appointed by governors of the states involved (McKinley 1960).

Unfortunately the climate was not yet quite ready for some of these visionary suggestions, especially since the unified approach would take away some initiatives from the states. It would be quite a few years before such suggestions would be translated into any meaningful sort of action on anything beyond individual state levels.

In 1904 an attempt was made on a national scale to implement legislation that would have greatly affected hunting in the Upper Mississippi region, both for sport and the market. This was the introduction of a bill by George Shiras of Pennsylvania to place federal controls on migratory birds, with waterfowl specifically in mind. This proposal failed to gain approval, but a similar effort did succeed in 1913. It was the Weeks-McLean Bill, also known as the Migratory Bird Law of 1913.

There was opposition to its implementation, and Missouri had forced the inclusion of a clause that would permit waterfowl hunting until February 1. Most importantly, the bill prohibited commercial waterfowl hunting for the market. Even though the insufficient sum of \$10,000 was first appropriated to enforce it, the prin-

ciple had been stated. In 1916 the law's principles were incorporated into a treaty with Great Britain for the protection of migratory birds in the U.S. and Canada. This became the Migratory Bird Treaty Act of 1918, which with better enforcement funding brought both protection and the end of the market gunning era. Shortly following, the great game trading center of St. Louis and lesser markets in the Upper Mississippi region shrank and disappeared.

Perhaps more direct impact upon the five Upper Mississippi River states was from the 1924 act of Congress that created the Upper Mississippi River Wild Life and Fish Refuge. The refuge extends (Figure 22) some 284 miles from the Chippewa River in Wisconsin to Rock Island, Illinois. This act had the effect of giving the states of Missouri, Illinois, Iowa, Wisconsin, and Minnesota a shared wildlife and habitat resource that would require or stimulate interstate cooperation, making more frequent contact and communication a natural result.

It is not farfetched to suppose that the resulting mutual awareness of the need to manage and protect (Figure 23) the wildlife and land resources of the Upper Mississippi was an important factor



Figure 22. Boundary posting on the Upper Mississippi River Wild Life and Fish Refuge.



Figure 23. A start at wildlife management—Junior Reservation Protector, William Oldenburg at cabin on Target Lake, Minnesota, October 25, 1928.

that led to the formation in 1943 of the Upper Mississippi River Conservation Committee, a group comprised of conservation representatives from all five states. Since that date, cooperative joint conservation efforts among the states have been greatly enhanced, and such cooperation has become the rule, whereas several decades prior, it was more the exception.

The wildlife management tools of today are many and varied, and many are more sophisticated than those in use during management's early years. Not only are bag limits and seasonal frameworks based on fairly precise estimates of varying factors such as wildlife abundance, hunting pressure, losses to predators, disease epizootics, and cyclic abundance of some species, but the modern wildlife manager also works within a premise that is more central to his discipline today than several decades ago. That assumption is simply that more than anything, game animals and birds need a secure place (or places) to complete the requirements of their annual life cycle. This place or combination of places is called habitat. Without this, other regulations are meaningless.

The paramount importance of wildlife habitat wasn't clearly recognized by some early champions of wildlife's preservation, perhaps because compared to today there was still a much greater

share of habitat available that could support healthy wildlife populations. It wasn't immediately obvious to some at the close of the nineteenth century that the vital land base for wildlife was already shrinking. Early efforts concentrated, first and foremost, on regulating the take, stressing such things as daily bag limits, length of season, legal shooting hours, and the like.

Wisconsin in 1887 closed all game-bird seasons except woodcock from December 1 to September 1, and prohibited both spring shooting of game and open water blinds for waterfowl. Four years later Wisconsin established the office of game warden to enforce these and other laws.

Waterfowl, heavily harvested for the wild-game markets, were the focus of a 1903 Illinois statute that prohibited the selling of such game killed within the state. The immediate effectiveness of the law is uncertain, but the sentiment and official state posture expressed very plainly the growing feeling that such activities were not beneficial to the future of wild-game resources. The year 1905 saw the state of Illinois place a limit of 35 on the number of ducks that could be taken daily. Prior to this action the only restrictions were a season framework, usually of six months or more and limitations of methods of harvest, such as outlawing of baiting, magazine shotguns, and live decoys. All of these were examples of the type of controls used early in this region's wildlife management. All or nearly all were aimed at protecting wildlife species by reducing hunting demand—and its effectiveness—upon game resources. These steps were important and necessary, but in the future new tools would be needed as the wildlife resource changed and the science of wildlife management evolved.

Somewhere along the line, certain of those concerned with the welfare and abundance of wildlife—particularly the huntable kinds—realized that not only were men harvesting these animals, but natural predators were also. It seemed logical to assume that if these losses to foxes and coyotes and raccoons and others could be reduced or eliminated, there would be both safer populations of game and more to go around for the human hunters. Predator control for some time came to be regarded as a primary management tool. In some cases regulations—where they existed—were liberalized to allow the increased harvest of predators such as the fox and raccoon. Other species, such as the coyote and wolf, had incentives provided for reducing their numbers. Up until the early 1960s, Minnesota still paid a bounty on wolves, including the

timber wolf, which was considered endangered but now is stable in number in northeastern Minnesota.

A species common to all five Upper Mississippi states was the target of a 1943 Illinois statute, authorizing counties to allow a bounty for fox scalps. Such actions were typical of their time. Some predator control is still practiced today, but only in quite specialized circumstances.

Though there have been some limited successes, at least over the short term, in predator control, the hindsight enjoyed by today's wildlife managers shows predator control to be both expensive for the results obtained and generally not very effective for substantially enhancing wildlife populations. This is particularly true on a continuing basis once the controls are relaxed. One of the reasons is that life-and-death interactions are much more complex than merely that of one predator species and one prey species. A fox may eat pheasants, but it also has an effect on the abundance of other animals, including predators such as skunks and raccoons as competitors for the same food base. Remove the fox and life becomes easier for the other predators. In addition to that, as the fox's abundance is diminished through control, the natural reproductive capacity of the fox usually increases due to the increased survival opportunities for each kit fox born. This increased productivity is a natural compensating factor that can at least partly offset the controls. The phrase "nature abhors a vacuum" applies also to foxes and other predators.

There may be some special circumstances which do justify some predator control, if managing primarily for huntable wildlife is the top priority. Where habitat is poor and a wildlife species is already in trouble, predators may sometimes have an inordinate effect upon that population. Where habitat is of good quality in all respects predator control is usually unwarranted (Figure 24).

Another early wildlife management approach was stocking of game species in areas where they were reduced or eliminated by some kind of natural calamity or through habitat change brought about by land-use practices. Another type of wildlife stocking is to support put-and-take hunting, also sponsored by sportsmen's dollars and provided by state wildlife agencies.

But as noted wildlife biologist the late Werner Nagel (1956), pointed out, artificial stocking usually

cannot establish game or fish of any species where the habitat will not support wilder, much hardier native stock. When habitat is im-



Figure 24. Predators, an important element in natural systems.

proved, the wild native species will fill it to capacity much faster, at a lower cost, and with better game, than artificial propagation can do.

There are still some individuals today who believe that "quick-fix" approaches to wildlife management will produce effective and financially feasible improvements in wildlife numbers. But most wildlife managers, and more and more of the general citizenry, are awakening to the realization that good habitat is the cornerstone of wildlife abundance. Aldo Leopold (1933), though a wildlife management pioneer, was a visionary who summed up the need for good wildlife habitat rather than the other short-cut approaches when he said:

Conservation, if it is to succeed, must evolve compensating measures which change millions of acres back to the status of possible game range, and which have the same stability and geographic sweep as the clean cow pasture or the full silo, and for the same reason: because they appeal to the heart or purse of the farmer.

Or, it might be added, if these measures appeal enough to the rest of us, that we are willing to fight and to pay for them. If much of the land already lost cannot be retrieved, perhaps at least we can preserve what we still have, and try where we can to recover lost ground.

## 5 Present Geography (Remaining Habitats and Remaining Wildlife) of the Upper Mississippi

Just as the Upper Mississippi River itself is a connecting element between the five states belonging to the Upper Mississippi River Conservation Committee, the topography of the river-bordering lands is too, in a general way. This is particularly true when you consider how different some of these states are in overall geography and topography. The river has given them a shared land character, and yet there are differences too, evident as one travels north to south or vice versa along the river. What follows is a series of word pictures illustrating some of the characters of the land and wildlife found both on and very close to the waters of the Upper Mississippi.

### Minnesota

In Minnesota as in all states of the Upper Mississippi, the river, upstream from St. Louis, is now a series of pools rather than a free-flowing watercourse (Figure 25). This is a result of the placement of locks and dams at intervals all along its length (Figure 26). Just below (downstream of) each dam, today's river is in character most like its original undammed predecessor: at its swiftest, and typically at its shallowest and narrowest (Figure 27). The river gradually changes character as you progress downstream, more marshy



Figure 25. Map of a portion of the Upper Mississippi River.



Figure 26. If the voyageurs were able to return to the Upper Mississippi they would find it a much-altered waterway, primarily due to the 28 locks and dams that have been built to span and control its flow for the purpose of commercial navigation.

and slower in the midsections, until just above the next dam it is deep, broad, and almost still.

Nick Gulden (personal communication 1980), Minnesota Department of Natural Resources Area wildlife manager stationed at Winona, Minnesota, describes the floodplain cover as being fairly consistent and similar from Red Wing not far south of Minneapolis/St. Paul, to the Iowa border.

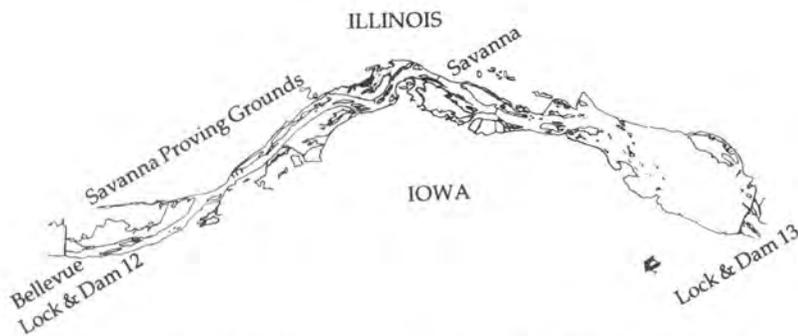


Figure 27. Satellite view of Upper Mississippi River Pool 13 showing characteristic impounding effect of navigation dams. Note the narrow riverlike nature below Lock and Dam 12 and the lakelike nature above Lock and Dam 13.

The timber types are primarily elm, ash and cottonwood, and of course the willow has always been one of the earliest successional species here. A lot of the islands are covered with willow. That seems to be the first plant to take root on the islands after they're formed.

There's very little understory. The understory within the woods itself is usually nettle, or poison ivy, and there's a large amount of wild grape along the river too. And in some areas you get some pretty decent dogwood growth, particularly if the canopy is quite open above. But the main flood plain itself is pretty much devoid of any decent understory.

Deer are commonly found throughout most of the river-bottom areas along Minnesota's side of the Upper Mississippi. According to Gulden, the low elevation flood plain areas are used heavily by white-tailed deer in the summer, but many of the deer move up into the hardwood-covered uplands in winter. Wild turkeys, reintroduced in Houston County, have become abundant enough to allow Minnesota to have limited hunting seasons each year. Though they are sometimes encountered very near the river, Gulden describes them as being more oriented to the hillsides and ridges, where oak and hickory are found. The same is true of another popular game bird, the ruffed grouse.

Furbearers, as one might expect, are in abundance on the floodplain. Raccoon, mink, weasel, and fox hunt the shallows and adjacent lowlands in search of freshwater mussels, other invertebrates, and small mammals for food. Skunks too are present here, and—well-traveled creatures that they are—are found in the higher uplands as well. Almost any environment can be home to a skunk. Opossum can be found here too. Much rarer and unexpected, a few remnant quail have managed to hold out doggedly at the northern edge of their range.

Values for waterfowl vary along the Minnesota reaches of the Upper Mississippi from year to year. According to Gulden, this is because each year may bring with it different and varying stages of water levels. When water levels are fairly stable throughout the year, choice aquatic vegetation such as sago pondweed, and even wild rice, provide a bounty for waterfowl in migration, and also for resident breeding birds.

Gulden adds that the best aquatic plant growth occurs roughly in the middle areas of the river's pools, where water is slower moving than just below the dams, but shallower and less silt smothered than just above the next dam downstream. This is

where the greatest degree of marsh development takes place. And here is where wood ducks, mallards, and teal breed. Pools 4-10 have perhaps the best such habitat, according to Gulden.

And yet all is not rosy for the continued productivity of the river marshlands. Marsh habitat has been deteriorating most noticeably since 1965, says Gulden, when flooding severely altered a number of high-quality marsh areas. Siltation has been a continuing problem as it gradually fills in shallow areas. Flooding, both major and minor, has accelerated the problem. The years 1967 and 1969 were also bad flood years in this respect.

Flooding also changes water-flow patterns. Gulden points for an example to the well-known Weaver Bottoms area between Wabasha and Winona, an area famous for abundant waterfowl and excellent hunting in the past. "A big portion of the Mississippi's flow now goes through the Weaver Bottoms," Gulden says, "and has made conditions less than desirable for aquatic plant growth." There are plans to one day change water flow through portions of the bottoms so that they can be restored to their "original" condition.

Historically, one of the problems that has threatened the continued usefulness of the river bottoms for wildlife has been the deposition of spoils from the dredging activities of the U.S. Army Corps of Engineers. In past decades, these spoils were dumped quite indiscriminately, often filling in marsh areas, Gulden says. But in recent years, public pressure has had its effect, and the corps has done much more to cooperate with various state and federal agencies to lessen the impact of dredging operations on river-bordering habitats. But in Gulden's opinion, siltation and dredging continue to be perhaps the worst two influences on river habitat. Gulden believes that if a 12-foot channel plan were ever adopted for the Upper Mississippi, aquatic vegetation would suffer either from higher water levels or from additional spoils deposition, if dredging the main channel deeper were chosen over raising water levels.

Siltation spawned by poor upland tillage practices and occasional introductions of toxic chemicals into the river from agricultural applications are a continuing reality. In some areas, such as near the city of Winona, homesites placed in wooded areas are more of a problem than agricultural land clearing. But "In general," says Gulden, "we have some excellent wildlife habitat around here, as evidenced by our large deer herd, our wild tur-

keys, abundant squirrel and stable grouse populations, and others too."

The Weaver Bottoms area mentioned earlier, located on Pool 5, also sees the migration of 5,000 to 8,000 swans in spring and fall, while Pools 7 and 8 are major concentration points for canvasback ducks, sometimes up to 150,000 at one time. This peak is usually reached in early November and represents a very considerable percentage of the total canvasback population. Scaup, sometimes 50,000 to 70,000 of them, also concentrate here.

## Wisconsin

Wisconsin first sees the Upper Mississippi in the vicinity of the town of Prescott, near the confluence of the Mississippi and St. Croix rivers. "The river itself is a relatively narrow corridor, with a large number of wooded, braided sloughs on our side of the river," says Ron Nicklaus (personal communication 1980), wildlife biologist for the Wisconsin Department of Natural Resources at La Crosse.

These are winding, wooded sloughs with running water, typically found on either one side of the river or the other—"other" here meaning the Minnesota side. The floodplain here is roughly a mile wide, whereas farther south it may be several miles in width. "Oddly enough," says Nicklaus, "the river never seems to go right down the center of the flood plain." Instead it winds in an alternating pattern with the bluffs close at hand on one side and the extensive sloughs predominating on the other. The character of the river is very similar from Prescott down to the head of Lake Pepin, and this stretch is described in the following paragraphs.

Nicklaus notes in 1980 that the water quality in the main river channel is still somewhat adversely affected by municipal and industrial discharges from the Twin Cities of Minneapolis/St. Paul, but that in the braided sloughs themselves off the main channel, water quality is quite good. Waterfowl habitat for species such as wood ducks, mallards, and teal is quite productive.

Among the plants in the backwater marsh areas are arrowhead, pondweeds, coontail, wild celery, elodea, and Eurasian milfoils. As you near the edge where river and upland meet, river bulrush becomes a common aquatic plant. In addition to the waterfowl that breed in and use these marsh areas during migration, other water

birds include the great blue heron, American or snowy egret and even such rare appearances as the avocet.

Beaver and muskrat are the two dominant furbearers found here, and river otters are evident too. All three are taken each year by trappers.

Northern hardwoods make up much of the river-bordering timber, with basswood and maple found in great abundance. Aspen and some birch are present too. The wooded land adjacent to the river is not continuous, but broken up frequently by open lands, once savannah or prairie, now mostly under cultivation.

White-tailed deer are abundant and are found both in the true bottoms, and on the adjacent uplands, just one more bit of evidence of this animal's great adaptability. Ruffed grouse are found in the woodlots scattered along the Wisconsin side of the river. Some are also found in the lowland bottoms, though Nicklaus says that typically they're less plentiful there. Unlike the Minnesota side where released pheasants have not thrived, Wisconsin has in this area "resident ringneck pheasants, which are now wild and unsupported by artificial release," says Nicklaus.

Just south of the reach described above lies Lake Pepin which represents a dramatic change in the river's character. It is essentially a great widening in the river, with gravelly and boulder-strewn shoreline maintaining a moderate shoreline vegetation typically made up of pondweeds, coontail, some wild celery, and other miscellaneous plant species. Early in this century Lake Pepin was a major harvest and gathering point for migrating waterfowl, particularly diving ducks. There were concentrations of canvasback, but the major species seem to have been the scaups. Heavy concentrations still used Pepin as late as the 1950s.

While Nicklaus acknowledges that divers still use the lake, he points out that Pepin no longer has the food resources that once supported vast numbers of birds in the fall. The invertebrate life, says Nicklaus, including fingernail clams, mayfly larvae, and others, have diminished significantly. Nicklaus blames water quality for this phenomenon and wonders whether industrial and municipal wastes generated in the Twin Cities might not be responsible. He refers to Pepin's slow water movement as making the lake in effect a great "settling basin," noting that toxic materials in the bottom sediments may have made life impossible for any large populations of these aquatic organisms.

Nicklaus cites evidence from the analysis of fish caught in Lake Pepin and intended for commercial markets, fish that have been refused for commercial sale because of high concentrations of such contaminants as polychlorinated biphenyls (PCBs).

The uplands adjacent to Pepin on the Wisconsin side are very similar to those above this great lake, with corresponding similarities in the wildlife species found there. Immediately adjacent to Pepin is an almost unbroken rim of wooded cover, while just back of it is broken prairie, scattered woodlots, and a substantial amount of open land, much of it in agricultural use. No leveeing is done here, for the land bordering the river is far too steep to make flooding a problem, and the flood plain is too narrow to tempt most developers to try to reclaim it, according to Nicklaus.

Below Lake Pepin, the river begins to assume what will be its characteristic nature for most of its remaining travels to its union with the Missouri. Here it is the lock-and-dam river, with three major habitat zones: running water sloughs below the dams, gradually grading into shallow water marshes about midway to the next dam, and finally open deeper water just above the next dam (see Figure 27).

This habitat diversity also translates into wildlife species diversity. Virtually every one of the major pools has a heron or egret rookery, according to Nicklaus. Squirrel, raccoon, and beaver are found in abundance particularly on the lands below the dams, shorebirds and wading birds of many kinds are found along the edges of the shallow water marshes farther downstream. Red-shouldered hawks are found in the bottoms and bordering uplands, and grouse are found both on the islands and—more commonly—slightly back from the river on its wooded slopes.

Deer are here too of course, as are a great variety of waterfowl species, and a greater abundance of songbirds than in the stretches above Lake Pepin. "From Prairie du Chien on up to Alma, Wisconsin, is probably the heart of the best habitat on the Upper Mississippi," says Nicklaus (Figure 28). Below this area, there is a gradual decrease in the abundance of aquatic vegetation, particularly submerged vegetation. Agricultural runoff may be one of the reasons, or perhaps effluents coming from the Wisconsin River, Nicklaus speculates.

Nicklaus adds that this Prairie du Chien to Alma reach of the Upper Mississippi also enjoys one of the highest degrees of protection of any part of the river, with much of the land under the juris-



Figure 28. ". . . the heart of the best habitat on the Upper Mississippi . . ."

diction of the U.S. Fish and Wildlife Service, and the Corps of Engineers, as well as the state of Wisconsin. In fact, the original lawsuits filed by the state seeking regulation of dredging done by the Corps of Engineers were based on sites within this stretch of the Upper Mississippi.

## Iowa

Iowa is the first state in the north-south progression of the Upper Mississippi to have a clearly defined transition from one river-bottom cover type to another that is radically different. As we proceed through our discussion, that will be quite evident. Jim Ripple, (personal communication 1980), wildlife biologist for the Iowa Conservation Commission for over a quarter century, described the character of these river bottoms and the vegetation and wildlife found there. There is similarity in these characteristics from the state's northern boundary near Lansing, to halfway down the state at Sabula. This represents—perhaps significantly—the extent of glaciation in Iowa.

Floodplain timber includes willow, cottonwood, silver maple, elm, and some pin oak. In the transition zone between the flood plain and the bluffs are species that are members of the northern hardwoods, including birch, hickory, white and red oak, and ash.

Dogwood, wild grape, prickly ash, and sumac are important understory species growing beneath these hardwoods and provide food for important forest wildlife species such as the white-tailed deer and ruffed grouse. Near the tops of these slopes, patches of native grasses sometimes can be found growing on warm back-slopes. These are often referred to as "goat pastures," says Ripple, and to some extent many are now being encroached upon by red cedar, cooling the earth and actually making a change in the microclimate there.

What has been said about the pools bordering Wisconsin with respect to waterfowl, obviously holds true for her neighbor Iowa across the river. Diving ducks such as canvasback and scaup use the lakelike portions of the pools just above the locks and dams, while in the pools' midsections—perhaps wet meadows or wild hay lands before inundation—true marshland has developed. Here are found the dabbling ducks such as wood ducks, mallard and teal, as well as the most abundant furbearer life. Mink, muskrat, some beaver, and a very few otter are found in these stretches. Rail and snipe are found here too, as are woodcock where seeps provide damp soil on the adjacent slopes.

Wood ducks (Figure 29) are the predominant waterfowl species in the pools' upper reaches, and beaver are typically more abundant here than in the true marsh of the pools' midsections. But mallards and teal and the furbearers mentioned are here too. In the



Figure 29. Subject of painting, sculpture, and other efforts to capture its beauty, the wood duck typifies the essence of the Upper Mississippi River.

heavily wooded upper reaches of some pools, wild turkeys have been known to frequent the bottomlands, though their favored haunts are the upper slopes and bluff areas, primarily in the vicinity of mast-bearing trees.

Both red and gray foxes are common predators along this stretch of river. The red is a creature of the prairie-forest boundaries, and therefore is found in a general way almost anywhere in these forested river-bordering lands where open land is not far away. The gray fox on the other hand, according to Ripple, is more a creature of the limestone outcroppings and timberlands along the river.

Both gray and fox squirrels are present, with the gray a creature of the mast-bearing portions of the river slopes and bluffs, and one who is less inclined to be abundant where man's presence is most strongly felt, says Ripple. The fox squirrel on the other hand is more likely to take advantage of the added agricultural crop bounty at the borders where river's edge woodland and farmland meet.

Ripple notes with concern the fact that more and more development is taking place on the river's slopes and bluffs on this stretch of river from Sabula to the state's northern border. Most of the land is privately held, and particularly near river communities, residential and recreational development is taking place. "Those home developers and bulldozers can go anywhere. There's a demand, and the developers are meeting it."

The lands in the river floodplain, on the other hand, are primarily owned and/or administered by either the Corps of Engineers or the U.S. Fish and Wildlife Service, giving them considerable protection. These are included within the Upper Mississippi Wild Life and Fish Refuge. There are also private inholdings and some sovereign state lands present in the floodplain.

Proceeding south of Sabula one encounters really another world insofar as wildlife habitat is concerned. Below this point lies the largely unglaciated portion of Iowa, and the flat, rich land is agricultural and very close to the river in many places. Diking is epidemic and lands behind the dikes have been pumped free of water so that they can be farmed. Some of the highest river banks here are 80 to 100 feet, whereas farther north they may reach 600 feet in elevation. The comparison between widths of riverbank cover is just as dramatic. In some places on the Iowa portion's upper stretches, the cover may be as much as three to five miles

wide, whereas only a narrow strip of trees may be all that separates river from farmland in many places below Sabula, though the buffer occasionally may be as wide as a half mile.

Wildlife use varies correspondingly with the climate and the amount of cover that is present. White-tailed deer, fox squirrel, raccoon, muskrat, and mink are more or less universally distributed along the Iowa side of the river. Ruffed grouse are present down to Dubuque County. Bobwhite, quail, and cottontail rabbit populations increase as we travel from north to south. Wild turkeys are making a good comeback as a result of recent restocking efforts. There are several significant waterfowl and furbearer management areas located in and adjacent to the Iowa portion of the Upper Mississippi River. From north to south there is Duck Lake, Lansing Big Slough, Lansing Big Lake, and Harpers Ferry closed areas in Pool 9. As we progress southward there is Harper's Slough, Wyalusing Slough, and the Guttenberg Bottoms. Further downstream is the Pleasant Creek closed area, the Green Island Wildlife Area, Green Island bottoms, Elk River closed area, and the Princeton Wildlife Area. Below Muscatine we see the beginning of the Mark Twain National Wildlife Refuge with its Louisa unit and The Iowa Conservation Commission's Lake Odessa Wildlife Management Area. Further downstream, Pool 19 provides one of the major diving duck habitats associated with the Mississippi River system. Up to one-half million ducks have been concentrated there during the migration period, thus attracting large numbers of outdoor enthusiasts viewing this natural spectacle.

## Illinois

The stretch of river bottom and its bordering lands from Illinois' northernmost border to the Quad Cities of Davenport, Rock Island, Bettendorf, and Moline lies within the borders of the Upper Mississippi River Wild Life and Fish Refuge. This jurisdiction of the U.S. Fish and Wildlife Service results from an agreement with the Corps of Engineers, the agency which purchased much of the land along the river prior to completion of the locks and dams on the Upper Mississippi.

Marshes and side channels abound on this Illinois section of the river, very similar to the Wisconsin lands above it, according to Don Steffek (personal communication 1980), wildlife biologist

with the Fish and Wildlife Service at Rock Island, Illinois. Steffek was formerly with the Illinois Natural History Survey.

Edging back from the river toward the bluffs are the bottomland hardwoods including soft maple and cottonwood, grading into oaks, hickory, and such species as hard maple on higher ground. Button bush and other associated brushy shrub types abound in a transition zone—or “ecotone”—between the marshes and the hardwoods, but there are comparatively few of these plants in the understory beneath the hardwoods. This is due to the long-term protection that has allowed the forest to reach climax or near-climax stage, shading out the lesser woody plants beneath them.

River bulrush is the predominant aquatic emergent plant in the adjacent river marshes, along with some hard-stemmed and soft-stemmed bulrush. Additionally, there are lesser quantities of cattail, which are less able to thrive due to river-level fluctuation, says Steffek. Despite federal ownership of much of the land upstream from the Quad Cities, some is in private hands, and this many times results in land development right up to within several hundred feet of the river. Farmland diking or leveeing is perhaps the most obvious example of such development. The land contour tends to be a gentle upward slope to the base of the bluff areas, then more sharply upward to the flatter agricultural land.

White-tailed deer inhabit these river-bordering lands in abundance, and the bottomlands contain numbers of gray and fox squirrels, and one of the area's chief mammalian predators, the gray fox. These bottomland hardwoods are also of great importance to a wide variety of songbirds during nesting periods and also during migration.

Closer to the water's edge are found wading birds such as the great blue heron, green heron, black-crowned night heron and common egret. Raccoon, muskrat, mink, and some otter can be found in this diverse habitat. Beaver are in some instances so abundant that there are complaints about their dam building activities and the associated flooding, Steffek says. Some red fox are found here too, though they are an animal of higher elevations than their gray cousin.

The most common breeding waterfowl species in all of Illinois is the wood duck, and this is particularly true of the lands bordering the Upper Mississippi. Mallards and blue-winged teal are less common resident breeders, along with a very small number of hooded mergansers. During migration, these river marshes are

primarily the haunts of the dabbling ducks. Farther south, particularly in the pools closer to Pool 19 (Keokuk Pool) are found the large concentrations of divers (Figure 30).

As one might expect, the section of river within the Upper Mississippi River Wild Life and Fish Refuge is “relatively speaking, in the best shape of any area along the border of Illinois,” Steffek says. But along the river between the Quad Cities and Alton, Illinois, there is a gradually diminishing quantity of submerged aquatic vegetation. Important species such as sago pondweed and wild celery are among those affected, due apparently to the increasing silt load caused by agricultural runoff from tilled land. This heightened murkiness reduces the light penetration needed for growth of submerged aquatics.

Emergent aquatic vegetation is better able to tolerate increased siltation, but Steffek notes that as the problem increases they will be affected too, due to decreased light availability during the spring growth period before they emerge.

On a more encouraging note, Steffek points out that a decreased silt load can result in a comeback for these species:

In 1977 when a friend and I were doing a paper on submerged aquatic vegetation in Pool 19, it was a drought year. Therefore there was



Figure 30. One of a “cast of thousands” in the annual fall spectacular on Pool 19, Keokuk, Iowa.

not much sediment entering the river due to decreased run off. It was amazing how much more of the submerged aquatic plants there were that year. So the seeds seem to be there and ready to grow, but are just waiting for the right conditions.

Segments of the river-bordering lands below the Quad Cities are in public ownership, as part of the Mark Twain National Wildlife Refuge. But comparatively speaking, there are fewer areas in public ownership than in the stretch upstream, and the river's character is more "developed" in nature, except in these specific areas. The development spoken of is mainly agricultural in nature, primarily row crops such as corn and soybeans. There is, however, some industrial development, particularly near the towns of Quincy, Illinois, and Burlington and Keokuk, Iowa.

Steffeck points out that as one travels farther and farther south water quality problems increase. Effluents from municipal and industrial sources are part of the problem, though Steffeck notes that since higher Environmental Protection Agency standards have been enacted during the 1970s, this problem has abated somewhat. But the problems of siltation caused by increasing amounts of soil being washed into the river have not abated, and in fact are growing gradually worse.

Bottomland hardwoods and the creatures found within them and their associated plant community are scarcer too, due to increasing degrees of land development. The trend toward less extensive river marshes also continues. Keokuk Pool, already mentioned, is the largest pool on this stretch of the river, being built first and constructed to generate hydroelectric power as well as to stabilize water levels. It therefore, due to its size (length of some 20 miles and width of 2 to 3 miles), has more lake characteristics than the other pools. The extensive silted areas upstream from the dam have made it possible for fingernail clams and other aquatic invertebrates to thrive prodigiously and have therefore made Keokuk one of the premier concentration points for migrating diving ducks in the Mississippi flyway.

"Below Alton, the whole character of the river changes," according to Steffeck. One big reason for this change is that the Upper Mississippi's waters are joined by those unfettered brown-tinted waters of the Missouri. The silt load is greatly increased by this union. Another reason is that from the Alton-St. Louis area on south, the river is no longer controlled by the Corps of Engineers' lock and dam system. The river tends to be deeper, swifter, and

narrower, in part due to the wing dams and other structures placed by the corps part way across the river to divert its waters and thereby maintain river depth.

However, these structures have also slowed water flow near the river's banks. And, it is interesting to note that the areas where some of the dikes stood six to seven feet out of water at low river level when they were installed in the 1930s are today being farmed because so much silt and suspended soil has been deposited behind them. The net effects have been negative for fish and wildlife, in Steffeck's estimation.

In addition, the Corps of Engineers has in some locations put closing dams across river side channels, thereby reducing navigation channel maintenance problems, but at the same time cutting off the steady water flow to these channels. When high water levels go over the tops of these dikes, the water going into the channel is slowed, and silt is deposited. The ponds or wetlands behind the dikes eventually become perched above normal water level and often stagnate or dry up completely when the river returns to normal flow. Wildlife values are hurt again.

From the St. Louis area on southward, the trend toward less land in public ownership continues. Also, the oak-hickory forest in the bottomlands begins to change to the type known as the "southern hardwoods," typically including trees such as pecan, pin oak, and eventually cypress.

Wintering waterfowl are a relatively common attraction in southern Illinois. Large numbers of ducks and geese utilize the state and federal refuge areas that have been established on the Illinois side of the river. Some of the major ones include Horseshoe Lake, Crab Orchard, Carlyle Reservoir, and Union County Wildlife Area. Up to 200,000 Canada geese winter at Horseshoe Lake.

The most intensive management efforts in this area are, as might be expected, designed primarily for the benefit of waterfowl and are carried out by the U.S. Fish and Wildlife Service and Illinois Department of Conservation. Water level manipulation is an important tool and is employed particularly in Pools 24-26, Steffeck says.

Other creatures found in abundance in these lower river locations include white-tailed deer, muskrat, beaver, opossum, and raccoon (Figure 31). Steffeck points out that even though there may be less acreage available for wildlife in the southern Illinois



Figure 31. A master of adaptability, the raccoon provides fur and sport in abundance for the trapper and houndman. Photo courtesy of the Missouri Department of Conservation, Don Wooldridge, photographer.

stretch of the river, the land's fertility produces a surprising abundance and species diversity.

## Missouri

Bill Dieffenbach (personal communication 1980), environmental coordinator for the Missouri Department of Conservation who during his career has had considerable experience dealing with Upper Mississippi River issues and management, provided information on the habitat and wildlife on the Missouri lands bordering the river. The segment from the mouth of the Missouri River to the state's northern border is very similar in terms of vegetative cover and wildlife species. It is also similar to its neighbor across the river, Illinois.

At water's edge, and on sandbars and fringes of the islands, willows are found in great profusion, anchoring and augmenting newly forming soil. Their great tolerance for wetness makes them naturals for pioneering and continued growth along the very edges of the river.

On slightly higher and drier soil are soft maple and cottonwood. These "by far dominate the tree species here," says Dieffenbach. He also notes that foresters and forest wildlife managers familiar with the region observe that these trees have essentially replaced many nut-producing tree species which long ago were cut down, and have not reseeded due to flooding, the general rise in water table caused by lock and dam construction, and general competition from established trees, grape vines, poison ivy, and other shrubs. "It's just too tough for many of them to get through," Dieffenbach notes.

A modest number of these mast-bearing trees have been able to survive the intense competition for sunlight. They include trees such as pin oak and pecan. These are often found in association with the maples. In addition to the orderly gradation of tree species from high to low ground on the river's banks and floodplain, this same pattern is in evidence on some of the larger, well-developed islands along the river.

Higher up on the banks of the river are found oak and hickory along with some cedar glades and interspersed grassland. There are rolling hills and some very steep contours to the slopes.

Deer are prevalent both in the lowlands and on the slopes higher up. Wild turkeys are there too, though they probably spend more of their time in the uplands. Squirrels (Figure 32), fox, skunk, and a variety of woodpeckers—including the giant pileated—share the woodlands bordering the river with ruffed grouse which have been stocked recently though their numbers are still modest, says Dieffenbach. Muskrats, raccoons, and opossum frequent the lowlands, but muskrats are not as abundant as farther to the north where marsh development in the river's pools is generally more extensive.

On the river itself breeding waterfowl include wood ducks as well as smaller numbers of mallards and blue-winged teal. However, the river at this point, with poorer marsh development and fewer side channels, is not as productive of waterfowl as lands along the states to the north.

At the opposite end of the elevation scale, where the river's bluffs meet cleared and other agricultural land, pheasants are found. Cottontail rabbits are also fairly abundant and are a much-hunted wildlife species.

Progressing southward along the river, particularly below its confluence with the Missouri River, "the wooded cover is almost



Figure 32. "Southern hardwoods" in the lower reaches of the Upper Mississippi River provide homes for squirrels and haunts for the squirrel hunters. Photo courtesy of the Missouri Department of Conservation, Don Wooldridge, photographer.

all willow and cottonwood," says Dieffenbach. Here, where the river's sediment load is up to ten times as great as above the junction, the riverbed and adjacent soils are much more sandy, and vegetative growth is correspondingly more sparse. Populations of muskrats, wood ducks, and other marsh-dwelling inhabitants are also lower.

Though there's a considerable amount of public land above the confluence—much of which is Corps of Engineers or Missouri Department of Conservation land—public land is very limited below. Agricultural activity is very intensive, particularly where the adjacent lands are relatively flat. The band of trees and other wooded cover between river and upland varies, but is nowhere near as extensive as upriver. Much of the land near the river is leveed, and what would otherwise be floodplain or low upland, is now dry and farmed.

Soybeans, corn, wheat, and milo are important cash crops for area farmers and are attractive to farm-oriented wildlife species, particularly rabbits, doves, quail, and deer. Some very large is-

lands here are partially cleared and farmed, providing an excellent mix of cover and food for wildlife.

In contrast there are also some leveed bottomlands where there is very little wild vegetation at all, with crops being grown almost right up to the riverbank.

Beyond the obvious cover and wildlife similarities and differences in the various locations along the Upper Mississippi River, there seems to be a constant which clearly affects wildlife habitat and wildlife abundance. The habitat is best, and wildlife seems to thrive best, where the river lands are either in public ownership, or are of a character that makes them ill suited for development or commercial gain.

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# Wildlife Management Today

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Few professionals in the wildlife management field would challenge the statement that management concepts have changed greatly in recent decades. Not only have some of the practices of the profession changed, but management philosophies themselves have changed too. For instance, predator control and artificial propagation and stocking were once the mainstays of almost every management program, both in the Upper Mississippi River states and elsewhere. Today these practices have become far less important in most management agencies' total programs.

Overall emphases are changing. While the old tools still have their uses in certain circumstances, their primacy has been greatly diminished. More important today are what might be called "total environment" concepts. This holistic approach is designed to assure environmental soundness or balance. It has provided more long-range benefits and has been less expensive to implement and operate.

In a healthy and balanced wildlife community, management costs are minimal compared to continual-maintenance management programs, such as the put-and-take game stocking, and the take-and-retake involved in predator control. The seeds of future wildlife generations are planted by these creatures themselves only where habitat is of sufficient quality. Relative quality determines wildlife abundance, despite such factors as disease, predation, and other mortality influences.

Periodically habitat may have to be manipulated to keep it in a recession stage or condition that is optimum for producing cer-

tain desired species. With overall habitat quality as an important goal, other wildlife species—including songbirds, furbearers, other small mammals, reptiles, and so forth—will also have secure and adequate places to live.

The condition of the land itself—its wholeness and the attendant quality of aesthetic appeal—is the result of a sound total environment approach to management. Wholeness and aesthetic appeal have become more and more important as multiple-use land management comes to embrace a breadth of activities that may include hunting, timber harvest, bird watching, skiing, hiking, and others. This is true in varying degrees in all of the five Upper Mississippi River states.

Further evidence of the growing importance and acceptance of this total environment outlook is the fact that many state wildlife departments have or are in the process of initiating special non-game wildlife programs, whose focus is the status and welfare of wildlife species that are not hunted (Figure 33). Minnesota's Department of Natural Resources, for example, began its non-game wildlife program in about 1977. Wisconsin Department of Natural Resources established its Office of Non-Game and Endangered Species in October of 1978.



Figure 33. All wildlife species are important. An Upper Mississippi River heron rookery.

While management that focuses on non-game wildlife is a departure from traditionally accepted doctrine, the emphasis on balanced habitats favors game species too. Management for balanced habitat has been central to the lands of the Upper Mississippi River states that lie within the Upper Mississippi River Fish and Wildlife Refuge, as well as on state-controlled management units nearby. The fact that many of these areas are heavily visited and used by members of the public other than hunters is strong testimony to the greater benefits that accrue from protecting and enhancing all elements of the land's potential.

Unfortunately, preserving wildlife and the habitats in which they live involves some hard and expensive choices on the part of the public, and the agencies charged with administering public land policy. There is a terrific demand for land these days and in most cases plenty of buyers ready to purchase it. Land is sought today for residential, industrial, and agricultural uses. Lands that are to be managed for wildlife typically must be purchased or protected by easements that prohibit certain practices.

Wildlife agencies these days often cannot compete dollar for dollar with these other demands for land use. Corporate and private demand raises land prices to a level where they are often out of reach of wildlife agencies. A typical scenario might feature a private landowner whose land is sought by a residential developer or creator of an industrial park. The projected profits from such development may be so great that the price offered soars far beyond prevailing real estate values for other less sought-after properties nearby. The landowner finds it too lucrative a transaction to pass up.

Carrying this scenario further, the land's character is often changed to the detriment of wildlife as wetland areas are drained and protective vegetation and food species are reduced or eliminated. A familiar example is the land along the Upper Mississippi where leveeing has made large acreages secure from flooding. These then become choice locations for expanded agricultural production or for commercial construction. Land prices behind the levees soar, and soon most of the land is in the hands of developers. Some of the levees presently being built as this is written, such as the Fulton Flood Control Project in Illinois, are designated as having up to 200-year flood protection, making them particularly desirable for development.

Agriculture continues to be a major competitor with wildlife management agencies for choice wildlife lands. These lands may initially be marginal for farming, but with agricultural land prices reaching the high levels they have today, the costs of clearing and/or draining seem minimal in the long run. Cost was even less a factor when federal funds were available for the purpose of helping farmers drain lands. It is paradoxical that federal dollars have also been spent to return once-drained lands to a former wetland condition.

Continued growth in agricultural output is going to require more and more use of marginal land, as the human population expands. Many agricultural experts have come to the opinion that barring some unexpected development, we've just about reached the upper limits of what can be grown on an acre of ground. Thus, ominously, it seems likely that the squeeze on remaining wildlife lands without official protection will be even greater in the future. If significant amounts of wildlife lands are to continue to be secured, the pace at which they are being protected and acquired will have to be stepped up. Missouri provides an excellent example of an innovative and important step in that direction.

In the late 1970s, Missouri citizens passed an initiative referendum which provides funds derived from one-eighth of one percent sales tax to be spent only for conservation purposes. Thus, that state's wildlife managers do not have to rely solely on revenues from license sales and arms and ammunition sales taxes to fund wildlife restoration and preservation projects. This very progressive law could be said to typify a new understanding of the fact that healthy wild lands benefit not just sportsmen and sportswomen, but large segments of the general public as well.

It will take further awareness on the part of the general public of the wide-reaching benefits of preserving wild lands, if continued acquisition and protection of such lands are to take place. This is a big challenge for those whose job includes helping to create this public awareness. It's a big challenge because as the decade of the 1970s came to an end and the 1980s began, increasing public attention was being focused on balanced budgets and reduction of taxes on a very large scale.

As this is written—and upon the testimony of wildlife professionals within Missouri's Department of Conservation—it seems unlikely that proposals for general tax increases for wildlife's sake would stand an easy chance of passage in state legislatures. Yet if

state wildlife agencies are to rely solely on license and firearms taxes for funding, the pace of wild land protection will be slow.

Multiple-use land management concepts have been very important and beneficial in some parts of the Upper Mississippi River area. However their chief utility seems to be in forested areas, where timber cutting for commercial purposes or even for private firewood use is used to improve habitat for forest wildlife. In some areas of Minnesota and Wisconsin multiple use seems to hold some very positive possibilities for the future. Unfortunately the lands along the river itself, particularly in Illinois, Iowa, and Missouri, are not as well suited to such practices. Multiple use is not often mentioned in the same breath as agriculture, or commercial, residential, and industrial expansion.

Some dramatic evidence is available to show the decline in waterfowl habitat along the Upper Mississippi River. Robert Jessen (personal communication 1980), group leader of the Wetland Wildlife Populations and Research Group for the Minnesota Department of Natural Resources, paints a gloomy picture. Wintering ducks—mallards primarily—once numbered 7 to 10 million birds in the Upper Mississippi and Illinois river valleys. By the mid-1950s, the figure had been reduced to 2 to 3 million birds. By the late 1970s, numbers were in the vicinity of one-half million birds.

According to Jessen, the birds' absence does not signal a corresponding decline in continental mallard numbers. But rather, instead of wintering in the Upper Mississippi and Illinois valleys, the birds have changed their tradition of wintering ground use. Now, they winter farther west on man-made reservoirs and irrigation project impoundments.

The reason for the change is a deterioration of the quality of habitat in the Upper Mississippi and Illinois valleys. Industrialization, commercialization, and channelization in some cases, have made these areas unable to host large numbers of wintering waterfowl. The birds have had to look elsewhere to find a place to winter. It seems that they've found it, and once they've established a tradition of journeying to those more westerly areas, their future migration patterns will favor these new locations.

If you're a duck hunter or just one who enjoys the spectacle of large numbers of waterfowl, the situation is very discouraging. Some birds still winter in these valleys. Others overfly and winter to the south in Arkansas, Louisiana, and elsewhere. But the fact

remains, a lot of precious wildlife land and the presence of the wildlife that used it is gone (Figure 34).



Figure 34. The habits of waterfowl will change with habitat change. Wildlife management has become habitat management. Photo courtesy of the Missouri Department of Conservation, Don Wooldridge, photographer.

Could there be a method for planning that would include wildlife even when it may conflict with man's economic values? Presently, there seems to be no regional or national machinery that provides a capability for determining what is in the best interest of the entire public. There are conflicting agencies with conflicting missions—conservation versus economic interest. Their staffs are hired to promote their own causes and projects.

The element of politics always seems to enter into such decision making too. Where a dam is good for local construction interests or a levee for agriculture or industry, good biology and sometimes even good economy take a back seat. Politicians thrive on votes, and votes often depend on short-term benefits for vested interests. Sound ecological principles often seem impotent in the face of such opposition.

If the prognosis for the future seems depressing, it should also make concerned citizens aware that the stakes are high, the cost great, and the time short. If we wish to have a clean river with eye-pleasing beauty and a healthy complement of wildlife to populate

it, public sympathy will have to turn to public support, active support, economic support.

It will also take unceasing effort to continue to educate the rest of the public and the decision makers in government, of the long-range values of healthy wildlife populations in a healthy environment in which we all must live.

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## 7

### **The Future of: History of Wildlife and Hunting on the Upper Mississippi**

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The past is almost always interesting, for it is usually filled with the colorful, the nostalgic, and the unusual. The "present" is such a brief moment in time that we do not dwell there for long. It is the future that we plan for, and that we can use our energies to shape. So it is with the wildlife resources and ecological character of the Upper Mississippi River. The river is far from pristine, blocked and diverted as it is by a multitude of dams and locks along its 926-mile length and pressed as it is by agricultural, industrial, and residential development at many points along its banks.

The river is still blessed with a multitude of valuable wildlife resources which may or may not be preserved or enhanced for the future. Decisions made in the coming years on how the river will be managed and developed will determine how this generation's descendants are able to enjoy these same resources. The future of the Upper Mississippi will be a very real issue for those of us who live, work, and play near it (Figure 35).

Dr. Richard (Rip) Sparks (personal communication 1980), aquatic biologist with the Illinois Natural History Survey since the early 1970s, expressed it well when he observed that we must address ourselves to the issues of whether "man's changing of the river has resulted in a net improvement for wildlife, or whether more harm has been done by man than would have been done by natural geologic processes."



Figure 35. The future: a superhighway for barges?

Sparks refers to the sometimes forgotten fact that by building the many navigation dams across the river, man has stabilized water levels and actually created many more acres of marsh and bottomland habitat.

Just as obvious, at least to one who is in close contact with the river, is the fact that we are gradually but steadily losing this newly formed habitat. Not only are agricultural, industrial, and residential developments gnawing away at its borders, but the river marshes themselves are filling with sediment due to tillage and other disturbance of soil cover in the watershed. This filling process eventually destroys the aquatic environment in the backwater segments of the river.

According to Sparks, the U.S. Army Corps of Engineers will contend that "We expanded the amount of wetland habitat that existed before, now we're just going back to the amounts of habitat we once had." Eventually, much of what is now aquatic habitat will return to mud flats and then to bottomland forest.

Are we merely going back, in a mathematical sense, to the amounts and quality of habitat we had before man harnessed the river? Sparks takes issue with that position.

Man no longer tolerates a free-flowing river that, when flooded, would carve new channels and leave behind new backwaters that would become productive habitat for waterfowl, furbearers and

other creatures that thrive in a wetland and bottomland environment.

Now we've put our farms and industries in certain areas along the river, and we've established a navigation channel in others, and we just can't tolerate a river that keeps moving around. We're not allowing the river to create any new areas, new habitat, as it once did. So for awhile we may still be ahead in total habitat acreage. But for how long?

In the meantime, all mathematical balancing aside, we're losing hunting, fishing, and wildlife resources that we've become accustomed to on the Upper Mississippi.

Most obviously threatened by the deterioration of the marshes are the waterfowl that use the river in migration. Without an abundance of aquatic vegetation and invertebrates, there is little food for them. There is also less food and cover for those species that nest and raise their young in the marshes. As the marshes fill with sediment and the water becomes increasingly turbid from suspended silt particles, fish populations decline too, and so do the wildlife species that depend on them, including furbearers and wading birds.

Sparks points to areas on the neighboring Illinois River as examples of what can happen due to sedimentation and riverbank development. On the Illinois, most of the vital aquatic vegetation for wintering waterfowl disappeared in the late 1950s, due, he believes, primarily to sedimentation. Many of the duck clubs along the Illinois now find it necessary to build low levees around the extensive mud flats. There they grow seed-producing moist-soil plants during the summer and then flood the area in fall to provide attractive feeding areas for waterfowl. However, the benefits to waterfowl obviously do not extend to fish and fish-eating creatures which suffered when the marshes filled up.

Management such as that presently being employed at locations on the Illinois River is expensive. "Instead of acting as caretakers for the natural system," says Sparks, "we could be forced more and more into becoming manipulative managers, needing large amounts of manpower, energy and money."

Sediment that settles out of the slow moving waters of the "lock-and-dam" river comes from many sources but most often comes from agricultural lands. Some runs off directly into the Mississippi, but much arrives via tributary streams. Some of these tributaries have even had settling basins built on them to trap sediment before the waters enter the river, but these too are filling and

increasingly become less effective. In the days when there was greater crop diversity on lands draining into the Mississippi, sedimentation was not as great a problem. Far fewer fields were barren in winter, being held down perhaps by winter wheat, or by the roots of forage plants in pastures and hayfields.

Today, row crops dominate the region, with corn and soybeans most prevalent. Fall plowing is now very evident, saving the farmer time in the spring, but leaving fields exposed to the winds of winter and to spring rains that wash topsoil into rivers and streams that lead to the Mississippi.

Washed along into the river with the soil are portions of the agricultural chemicals that have been applied on the croplands. It is possible even today (1982) to take soil samples on some farmland and find traces of DDT, dieldrin, and endrin, banned chemicals no longer in use, but which bind so tightly to the soil that they may remain in the earth for years. Some of these can still be found in the tissues of fish living in the river, and in the creatures such as herons and others that feed on them. Other chemicals still legal for cropland use also may find their way into the river.

Still another toxic substance that is found today in the river is the family of polychlorinated biphenyls, or PCBs, used in the manufacture of electrical components. These may leach out with groundwater from waste disposal sites along the river or enter the river by more direct means.

Chemical contaminants are potential threats to river wildlife through their detrimental effects on organisms that are necessary parts of the river food chain. These contaminants may also accumulate in the tissues of wildlife species that are higher up on the food chain, under certain conditions killing them, causing indirect mortality, or affecting their ability to reproduce.

Few would disagree with the fact that the most toxic chemicals entering the river are reduced in quantity from times past, yet no one has fully answered the question of "How much is too much?"

More visible threats to the river are seen in the development of industries, terminals, and barge-fleeting areas along the river. These installations do not go unnoticed as do sediment and chemicals. Instead they take large bites out of the shoreline, turning them from marsh or woodland into works of concrete and steel, or perhaps mountains of coal rising black and massive along the river's banks.

These developments have been encouraged by the subsidized maintenance of the Upper Mississippi River navigation system, according to Dr. Richard Sparks (personal communication 1980). This subsidy by American taxpayers works to the advantage of towing companies by providing a competitive edge over other transport systems such as railroads. The Corps of Engineers maintains the river right-of-way for the towing companies, whereas railroads must maintain their own right-of-way.

The most recent development in river navigation is the planned building of two new "super locks" (1,200 and 600 feet in length) at Alton, Illinois, the downstream terminus of the Upper Mississippi's lock-and-dam system. This new facility will replace the old smaller locks and dam at Alton, and thereby increase capacity to handle barge traffic. As transportation on the Mississippi becomes expanded, Sparks believes, towing companies will vie for the remaining suitable sites for barge fleetings and terminals to handle increased traffic. Industry will see added possibilities for locating or expanding on the river with improved means of shipping bulk commodities at tempting freight rates as compared with other transportation systems. Coal, grain, fertilizer, and petroleum companies are expected by Sparks to be likely industrial developers on an expanded scale on the river. The latter two offer the potential for catastrophic environmental consequences in the event of accidental release of raw materials or products into the river.

Some firms already on the river are seeking to expand. Sparks notes that a coal-handling company on Pool 19—the famed waterfowl migration stop known as Keokuk Pool—has sought permission to blast loose parts of the river bluffs in order to fill along the river edge to create more coal storage capacity. The Corps of Engineers, charged with permit granting authority for such projects, has already (1980) turned down this request once, after consultation with the U.S. Fish and Wildlife Service.

The city of Fort Madison, Iowa, also had wanted to develop a site on the river south of town for an industrial park. Research done by Iowa State University professors and graduate students determined that the site was an important feeding area for migrating waterfowl (particularly diving ducks). Consequently the permit application was denied by the corps.

But as Sparks points out, environmental decisions on the Upper Mississippi, as elsewhere, have a way of being "temporary,"

meaning that the issues have a way of reappearing again some time in the future.

There is a great deal at stake at places where shorelands are not protected by refuge or management area status. For instance, some of the most important and attractive waterfowl stopping areas on the river are not within refuge lands where development can be strictly controlled. This is just the case with Keokuk Pool, which Dr. David Trauger (personal communication 1980), director of the Division of Wildlife Ecology Research for the U.S. Fish and Wildlife Service in Washington, D.C., has called the most important inland area for diving ducks in North America.

In places such as this, it is much more difficult to ensure the future of wildlife habitat and wildlife, but it is no less vital. In recent years the Corps of Engineers has taken actions that have helped preserve these resources, something that many would not have expected from an agency that has long had a reputation for unbridled development, often at the expense of wildlife. In an area on the Keokuk Pool north of Fort Madison, Iowa, says Sparks, the corps has actually advocated raising levees to protect the river from fertilizer plants located there.

Sparks calls the U.S. Army Corps of Engineers "our last hope," not because he has ultimate faith in their management wisdom, but because of the permit-granting authority vested in that agency. Sparks notes that the corps has paid increasing attention to needs on the river other than simply navigation and has worked cooperatively with the Fish and Wildlife Service and state and regional agencies, toward policy decisions that are in the broad public interest. "They're more sensitive to environmental issues after having been burned so many times in the past," says Sparks.

But Sparks tempers his enthusiasm and optimism by noting that water resources programs are still subject to influences by special interest groups and other attempts to circumvent environmental progress on the river.

Then too there are other ways for vested interests to get around a regulation or decision which they do not favor. Sparks points to the issue of the 12-foot channel for navigation, which many thought to be a dead issue, but one which if implemented would have drastically altered the quality of marsh habitat along the river.

The new super locks at Alton are not only capable of handling more traffic than the old locks, but they can also handle deeper draft barges (12-15 ft.), says Sparks:

A lot of environmental groups feel that this is the opening wedge. In 5 to 10 years there will probably be traffic jams at the next lock upstream because of increased traffic, so there will be pressure to replace that lock too, and so the rest may go in stepping-stone fashion all the way up the river.

After replacing the locks with new ones having greater depth capacity, the only thing keeping commerce from having a 12-foot channel would be a little dredging. That's what happened on the Ohio River in the 60s and 70s, when it went from a 9-foot to a 12-foot channel. With this approach, it wasn't necessary to go to Congress to ask for authority or funding for a whole new lock and dam system. It was piecemeal instead.

Sparks feels that the encouragement of more and more traffic and commercial development on the upper river may be based more on political power rather than clear economic and environmental thinking. "We're putting more traffic on the river than either economic or environmental sense would justify."

There is a lot more thought and planning going into many of the decisions being made in recent times than previously. However, the planning process has not been made as valuable as it might be. "Some groups are highly vociferous, at least when a visible threat such as locating a power plant on their favorite duck marsh is concerned." But the more insidious threats such as sedimentation and toxic substances—the less visible ones—are not as well understood. "And the few people who do understand, often wonder what they can do," comments Sparks.

It may be that people along the river have become exhausted by the numerous planning meetings that have taken place, and so attendance at public meetings has dwindled. Sparks fears that people won't react perhaps until a decision has already been made and an area is about to be developed.

Sparks has primarily faulted the organizers of some of the meetings. He cites announcements written in the confusing jargon of planners and engineers, meetings often scheduled for the middle of workdays when many would-be participants cannot attend, and occasionally poorly organized meetings with uninformed representatives chairing them.

Sparks recalls a meeting concerning the Keokuk Pool that was chaired by planners who had never before been on the pool. They recommended that the corps dredge the bottom to create islands on the pool's lower end for use by boaters and campers. This just happened to be an area where each fall many area hunters set up

their duck blinds. The total ignorance of that fact by the planners did nothing to establish their credibility as persons able to deal intelligently and fairly with river issues.

Discouraging as it is that planning participation by the general public is sometimes minimal, Sparks has taken hope in the thought that "perhaps people are wise, and are saving their energies for when the chips are really down." In the long run public attitudes will very likely be the determining factor in decisions that affect the orderly management of the Mississippi River.

Sparks is not without optimism for the future. The environmental movement that was so strong in the late 1960s and throughout the 1970s showed that

at least people are aware that something as big as the Mississippi can be threatened, and people have come to accept a little more responsibility for decisions. They realize that if people really get riled up over an issue, they can do something about it. The Izaak Walton League, Sierra Club, and the various waterfowl associations, and others, all have had an impact. People, individually and collectively, are more active than they once were.

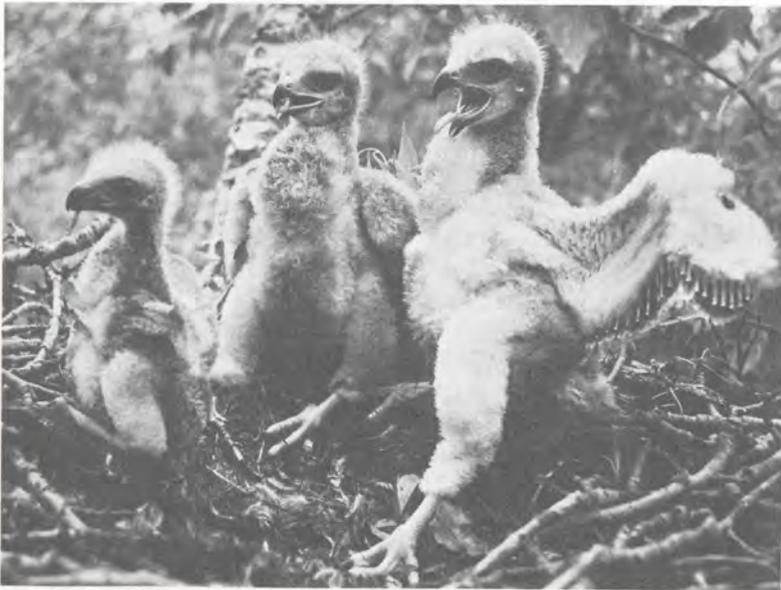


Figure 36. *The future must always belong to the young.*

There are reasons for both optimism and pessimism in an assessment of what the future may hold for the Upper Mississippi and the wildlife that lives on and in its waters, and along its banks. It is easier to recognize a threat that would eliminate wildlife habitat than one that works insidiously to destroy the vital components of the environment itself. Vigilance can help to protect both.

The river itself cannot be considered apart from the stability of the land that surrounds it. Both are linked inseparably and must be managed and protected as a single entity.

There is cause for hope, but also a need never to be content and believe the job to be done. The future must always belong to the young (Figure 36)!

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